Summer 8-2009

Relationships Among Elementary Teachers' Self-Perceptions of Musical Intelligence, Perceived Value of Instruction Through Music, and Classroom Instructional Practices

Peggy Jo Hubbard McCullough
University of Southern Mississippi

The University of Southern Mississippi

RELATIONSHIPS AMONG ELEMENTARY TEACHERS' SELF-PERCEPTIONS OF MUSICAL INTELLIGENCE, PERCEIVED VALUE OF INSTRUCTION THROUGH MUSIC, AND CLASSROOM INSTRUCTIONAL PRACTICES

by

Peggy Jo Hubbard McCullough

A Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

Approved:

August 2009

The University of Southern Mississippi

RELATIONSHIPS AMONG ELEMENTARY TEACHERS' SELF-PERCEPTIONS OF MUSICAL INTELLIGENCE, PERCEIVED VALUE OF INSTRUCTION THROUGH MUSIC, AND CLASSROOM INSTRUCTIONAL PRACTICES

by

Peggy Jo Hubbard McCullough

Abstract of a Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

August 2009

ABSTRACT

RELATIONSHIPS AMONG ELEMENTARY TEACHERS' SELF-PERCEPTIONS OF MUSICAL INTELLIGENCE, PERCEIVED VALUE OF INSTRUCTION THROUGH MUSIC, AND CLASSROOM INSTRUCTIONAL PRACTICES

by Peggy Jo Hubbard McCullough

August 2009

This study was designed to examine educators' perceptions and practices of instruction through music. Using primarily quantitative methods for collection and analysis of data, correlations were sought among the primary variables: elementary teachers' perceptions of the value of instruction through music, their self-reported frequency of instruction through music, and their self-evaluated level of musical intelligence. The hypothesis for this study was that a positive correlation existed between any two of the three variables.

Participants included elementary teachers representing instructional grades one through five from four elementary schools in the southeastern part of the United States. To collect data, a survey was administered to teachers. Using scores from the instrument, bivariate analyses using Pearson's product moment correlation were used to determine if a correlation existed between any two of the primary variables.

Upon analyses of the data, results indicated that positive correlations existed between each of the pairs of variables. Other findings included, but were not limited to, the following: how elementary teachers used music as part of instruction, teachers' self-efficacy, and teachers' multiple intelligences.

The study contributes to the limited research on how teachers' multiple intelligences and their perceptions of those intelligences impact their teaching practice. Furthermore, this research substantiated previous research which indicated that instruction is affected, even determined, by teachers' personal and pedagogical theories or beliefs. These instructional beliefs are characterized, at least in part, by the educator's Multiple Intelligences and self-efficacy. In this study, teachers' beliefs of their intelligences were positively related to the frequency and perceived value of instruction.

Recommendations for further study are indicated.

DEDICATION

This dissertation is dedicated to my dad who did not have the opportunity to further his education. He would have been pleased to know that I finally completed this important milestone in my life.

ACKNOWLEDGEMENTS

Many people participated in the completion of this study. Without their help, this research would not have been possible.

I appreciate those teachers who volunteered to complete the survey for the study. Their participation was invaluable. I am grateful to the districts and school administrators who allowed the teachers to participate. A special thanks to Dr. Mary Gobert and Dr. Frances Weiler for their assistance.

Thank you to fellow educator, Debbie Bebler. Her generosity made a tremendous difference during the final semesters of my research.

I am indebted to members of my Dissertation Committee for their commitment. Dr. J.T. Johnson's statistical expertise was a tremendous help. His ability to share his knowledge made my tasks much easier. I am especially grateful for the guidance and support of Dr. Rose McNeese. Her positive attitude and encouragement kept me motivated and on track.

My family provided much needed support during the completion of this dissertation. A special thanks to my daughter, Roxanne. Watching her develop and use her musical intelligence served as the initial catalyst for my interest in music and its positive benefits. My son, Duncan, served as my reader. His knowledge of grammar, writing, and music amazed me. Without his kind suggestions, I know that this dissertation would not be as well-written. Finally, I am blessed to have a husband who encourages me to pursue my interests. During the long process of completing this dissertation, Bobby was supportive, encouraging, and positive. I am grateful for his tenacity in tolerating my educational pursuits!

TABLE OF CONTENTS

LIST OF TABLES

Table

CHAPTER I

INTRODUCTION

The researcher's interest in music and instruction has evolved over the years to include many topics represented in this study. These interests include multiple intelligences, the use of music as a vital part of integrated instruction in elementary classrooms, and research relating to music, instruction, and the brain. This correlational study serves as a logical step in the natural progression of the researcher's interests. On a larger scale, this research also will contribute to the body of work regarding instruction through music and how teachers' perceptions and self-efficacy impact this instruction.

Music Research

Much research has been completed relating to the numerous emotional, social, and cognitive benefits of music (Jensen, 1998). The abundance of positive influences on students may be accomplished through musical instruction such as listening to music, singing, playing a musical instrument, and rhythmic activities (Jensen, 1998). Research has shown positive correlations between music and other subject areas (National Association for Music Education, 2006). Additionally, strong associations exist between music and skills, as well as music and cognitive functions (National Association for Music Education, 2006). However, it would be exceedingly simplistic to assume that music *causes* all the benefits with which it is associated. Nevertheless, the cognitive gains from music instruction have ranged from improved visual/spatial abilities to greater hemispheric connections in the brain (Jensen, 1998). Specific skill and subject content correlations also have been found. For example, research has shown that song lyrics containing factual content can help students learn and retain information (Campbell,

1990). In addition, a high correlation was identified between children's ability to read and ability to discriminate pitches accurately (Lamb & Gregory, 1993). Positive relationships between reading and music were also noted in an analysis of the Department of Education's National Education Longitudinal Study of 1988 (cited in Catterall, Chapleau, & Iwanaga, 1999). This same study found that musical learning has a positive effect on mathematics as well.

Music should be taught as an art form, a means of expression, and a subject in its own right (Schmidt, 2007). Ideally, this is true. But schools do not exist in an ideal world. Educators, students, and other members of educational communities are confined not only by instructional standards, but also by economic, political, social, and cultural standards (Brualdi, 1996). In many cases, these limitations have restricted or even abolished school music programs (Texas Music Project, 2007). When this happens, students too often exist in an educational setting void of music instruction. To rectify this deficit, classroom educators may be expected to assume responsibility for music education. Yet with constant time constraints affecting daily classroom instruction, many teachers may feel that it is impossible to include music in the core curriculum. However, strategies involving music, songs, and rhythmic activities may be accomplished through integration of music within other areas of the curriculum. Teachers may take advantage of opportunities to use music in conjunction with and as a medium for other subject matter.

Intelligence Measures

Only in recent years was an evaluation instrument developed and used as a standard measure of general intelligence. Prior to the early 20th century, some

psychologists had attempted to measure intelligence based on physical features or actions, such as the size of one's head or reaction time to stimuli (Johnston, 1997). Then in 1905 French psychologists Alfred Binet and Theodore Simon developed and published the first, modern intelligence test (Gardner, 1993). During his work on intelligence tests, Binet became convinced of the existence of diverse intelligences, rather than a unitary measure. Yet, Binet's theory was never fully developed.

Historically, most psychologists have considered intelligence a single, inherited factor. In more recent years, some psychologists have begun to agree with Binet's initial belief and espouse intellect as a multi-faceted measure. One current psychologist, Howard Gardner, promotes a theory of multiple intelligences. After the initial publication of his theory in 1983, more people began to consider or accept the idea of a "pluralistic view of mind" (Gardner, 1993, p. 6). According to Gardner, "people have many different cognitive strengths and contrasting cognitive styles" (Gardner, 1993, p. 6). He also described intelligence as a characteristic possessed by all humans, yet different in each individual (Gardner, 2003).

Gardner's theory states that an individual requires all intelligences to function productively in society. The intelligences act in consort with one another and are not mutually exclusive. In his book, *Frames of Mind: A Theory of Multiple Intelligences*, Gardner described intelligence as a perceptible ability to solve problems or create products, "thereby laying groundwork for the acquisition of new knowledge" (Gardner, 1983, p. 61). This framework describes how people draw on different skills, abilities, talents, and intelligences in order to gain new information and demonstrate attained knowledge (Gardner, 1983). Gardner's list of Multiple Intelligences has grown from

seven to eight since the original publication of his theory in *Frames of Mind: A Theory of Multiple Intelligences.* The intelligences are: Spatial, Verbal/Linguistic, Logical/Mathematical, Bodily/Kinesthetic, Interpersonal, Intrapersonal, Musical/Rhythmic, and Naturalist, the most recent addition to the list of intelligences.

Each of these intelligences represents the potential or ability to process information in certain ways and encompasses specific core operations (Harvard Project Zero, 2005). These core operations are basic information-processing mechanisms and are among Gardner's criteria for intelligence evaluation (Harvard Project Zero, 2005). To strengthen or develop an intelligence, the core operations of that intelligence can be improved through education and training (Gardner, 1993). Each intelligence is identified in Table 1.

Individual intelligences work in conjunction with other intelligences (Gardner, 1983). However, in modern, western cultures, academic subjects traditionally have been taught and assessed in ways that mainly involve two intelligences: linguistic and logical-mathematical (Brualdi, 1996). Schools in modern, western societies often overlook or ignore the existence of other intelligences (Gardner, 1993). Music, art, dance, and other non-linguistic or non-mathematical subjects may be perceived by some as "fluff." These non-core subjects are usually relegated to extra-curricular activities. Other intelligences besides linguistic and mathematical are valid ways to attain and present knowledge, yet may be limited or absent in the curriculum.

Table 1

Multiple Intelligences' Core Operations

Intelligence	Core Operations
Bodily-kinesthetic	Bodily control; ability to imitate movements or Skillfully handle objects
Interpersonal	Ability to notice others' feelings, emotions, motivations, goals, and intentions and their impact on other's behaviors
Intrapersonal	Awareness of one's own feelings, emotions, goals, motivations, and intentions and their effects on one's behaviors
Verbal-Linguistic	Sensitivity to meaning of words and functions of language: syntax, phonology, semantics, pragmatics
Logical-mathematical	Awareness of logic, number sense, relations, patterns, analogies, and abstract reasoning
Musical	Sensitivity to pitch, rhythm, timbre, sounds and their impact on behaviors and emotions
Naturalist	Observation, awareness, recognition, and classification of objects, flora, fauna, and patterns in the natural environment
Spatial-temporal	Ability to accurately perceive one's world, make mental modifications upon one's initial perceptions, recreate accurate mental visualizations

(Gardner, 1983, 1993, 1991)

Musical intelligence is considered the intellectual capacity to perform, create, or appreciate music; it involves an understanding of pitch, rhythm, and timbre (Gardner, 1983). Based on Gardner's definition of intelligences, music may be a way of acquiring new information or even solving problems. According to Boyer (1983), for some learners music is a dominant way of learning or knowing; therefore, it is logical that for teachers it

should be an accepted, on-going way of teaching. Student learning may be reinforced when concepts, skills, information, and ways of thinking are presented through musical strategies and structures (Boyer, 1983; Jensen, 1998). Therefore, in the repertoire of instructional possibilities, a significant relationship may exist between the use of music to enhance and support instruction and the ultimate success of that instruction. Music may provide an avenue which enables teachers to instill necessary information, skills, and attitudes into the minds of students.

Proficient and successful instruction in any subject matter, music or otherwise, is affected and determined by the teacher's personal and pedagogical theories or beliefs (Ross, Cornett, & McCutcheon, 1992). These beliefs serve as the teacher's internal guide when making instructional choices. These choices are defined, at least in part, by a teacher's multiple intelligences and his or her self-efficacy related to specific instructional tasks (Chan, 2003).

Self-efficacy

Self-efficacy is a conviction or belief that one can successfully coordinate and carry out the actions necessary to manage potential situations (Bandura, 1986). Based on research in self-referent thought, it has been shown that self-efficacy plays a vital role in one's feelings, thoughts, behaviors, and motivation. Since an individual's actions often are based on beliefs about what he or she can do, one's beliefs are better predictors of behavior than one's actual capabilities (Bandura, 1997). People who doubt their abilities related to a task are more likely to shy away from that particular task (Bandura, 1986).

Self-efficacy also plays an important role in classroom instruction. Teachers' perceptions of their "strengths or multiple intelligences" may "affect their self-efficacy

beliefs. . . when teaching and helping students" (Chan, 2003, p. 522). This view of self may affect the task persistence or instructional time an educator offers to students. Teachers spend more time teaching in subject areas in which their sense of self-efficacy is higher (Riggs & Enoch, 1990). The reverse is also true; in those subject areas in which they have a lower sense of self-efficacy, teachers actually avoid instruction (Riggs, 1995).

Based on the research of Bandura, Chan, Enoch, and Riggs, one may logically deduce that teachers who perceive themselves as having greater musical intelligence are more likely to use music in their classroom instruction. By recognizing their own multiple intelligences, teachers may also identify talents and areas for improvement. The knowledge of these strengths and weaknesses may enhance the teachers' classroom practice.

Statement of Problem

There exists an abundance of research on the benefits of utilizing music as an integral part of classroom instruction (National Association for Music Education, 2007). However, there appears to be little information regarding teachers' perceptions, opinions, and classroom practices related to the use of music in their classrooms.

Since the publication of Gardner's *Frames of Mind: Theory of Multiple Intelligences*, much has been written about applying this theory to classroom practice. The main emphases have been students' learning based on multiple intelligences and how teachers can use knowledge of students' intelligences to improve classroom practice. Unfortunately, little emphasis has been placed on the possibility that teachers may be restricted or advantaged by the strengths and weaknesses of their own multiple

intelligences. Therefore, students may be indirectly influenced by teachers' perceptions of self. Instructional ability may be affected not only by the existence and dominance of one's multiple intelligences, but by one's perceptions of abilities related to these intelligences (Chan, 2003).

Purpose of the Study

This study's primary purpose was to examine elementary educators' perceptions and practices of instruction through music. Instruction through music is much more than having students listen to music during class. It is the active use of songs, rhythmic activities, or other musical forms as a relevant, interrelated part of classroom instruction. These uses of music may set an appropriate tone or mood for classroom instruction, establish interdisciplinary connections, or impart and reinforce subject matter.

This study contributes to the limited body of literature relating how teachers' multiple intelligences and their perceptions of these intelligences impact their classroom instruction. More specifically, this study analyzed relationships among elementary teachers' perceptions regarding the value of relevant instruction through music, their self-reported frequency of instruction through music, and their self-evaluated level of musical intelligence.

At the school or district level, this study may be seen as a precursor to professional development. The self-assessed evaluation of teachers' multiple intelligences may be viewed as a needs assessment. Professional development may be planned according to teachers' least dominant intelligences and viewed as a means to strengthen teachers' intelligences. Improving the musical intelligence of teachers may serve to improve teacher efficacy in providing instruction through music. The results may

be an impetus for improvement in teachers' intelligences and, ultimately, improvement in efficacy of instruction.

Research Question and Hypothesis

The primary research question for this study was: What relationships exist among teachers' perceptions of self-evaluated musical intelligence, their perceived value of instruction through music, and the teachers' frequency of instruction through music in their classroom practices?

This study showed correlations between pairs of the three main variables: teachers' perceptions of self-evaluated musical intelligence, their perceived value of instruction through music, and the teachers' instructional practices. The primary hypothesis was that a positive correlation existed between any two of the three main variables. In other words, teachers with a greater level of self-evaluated music intelligence would regard instruction through music as more valuable and utilize instruction through music more frequently than those teachers with a lower level of self-evaluated music intelligence.

More specifically, the study addressed the following questions:

1. What are elementary teachers' perceptions of instruction through music? How do teachers perceive the value of instruction through music?
2. Do elementary teachers utilize instruction through music? If so, with what frequency do teachers use music during instruction?
3. Is there a relationship between the teachers' perceptions of the value of instruction through music and their self-reported frequency of instruction through music?
4. For study participants, which of the multiple intelligences is dominant? In relation

to the strength of other intelligences, how dominant is musical intelligence?

5. Is there a relationship between teachers' perceptions of the value of instruction through music and their self-evaluated level of musical intelligence?

Is there a relationship between teachers' self-reported frequency of instruction through music and their self-evaluated level of musical intelligence?

Definition of Terms

Academic content or subject matter - Content or subject matter refers to the concepts, principles, and skills which students are expected to learn. The content may include historical, scientific, linguistic, mathematical information, as well as concepts related to the arts.

Balanced instruction – Balanced instruction is most often used to describe reading instruction which combines phonics with whole-language to teach skills and meaning in context. In a more general sense, balanced instruction implies that the classroom teacher employs a variety of methods and strategies in order to meet the needs of students.

Belief - A belief is a state of mind in which trust or confidence is placed in a person, thing, or action related to the belief.

Core curriculum – A core curriculum usually is a specified set of courses that serve as an academic foundation for all students. The core curriculum courses are designed or chosen to impart fundamental knowledge of primary areas of study.

Cross-curricular or integrated instruction – Cross-curricular instruction involves a conscious effort by the teacher to apply knowledge, principles, skills, and/or values to more than one academic discipline simultaneously. The disciplines may be integrated or related through a central theme, experience, or process. Cross-curricular teaching

provides a meaningful way which students can use knowledge learned in one context as a knowledge base in other contexts (Collins, Brown, & Newman, as cited in Resnick, 1989).

Differentiated instruction – Differentiated instruction is a teaching philosophy based on the premise that educators should differentiate, adapt, or modify instruction to meet the needs of each student.

Entry point - Entry point refers to a student's strength, level of understanding, or dominant Multiple Intelligence. Beginning instruction at the student's entry point enables better understanding of academic content (Gardner, 1983).

Instruction through music - Instruction through music is the active use of songs, rhythmic activities, or other musical strategies to impart or reinforce subject matter, set an appropriate tone or mood for classroom instruction, or establish interdisciplinary connections.

Melody – Melody is created by the intervals among musical notes.

Multiple Intelligences – Multiple Intelligences are eight categories of intelligence or ways to demonstrate intellectual ability. Conceived by Howard Garner, the Theory of Multiple Intelligences purports that all humans have some degree of each of the eight categories of intelligence. These eight multiple intelligences are Visual/Spatial, Verbal/Linguistic, Logical/Mathematical, Bodily/Kinesthetic, Interpersonal, Intrapersonal, Naturalistic, and Musical/Rhythmic (Gardner, 1993).

Musical intelligence – Musical intelligence is simply a way of knowing, thinking, and learning. In Howard Gardner's Theory of Multiple Intelligences, a person with musical intelligence would utilize musical abilities to solve problems, create responses,

and acquire new information (Gardner, 1993).

Pedagogy – Pedagogy encompasses the theories, principles, and methods of instruction related to teaching.

Process – Process may refer to the strategies or activities employed by teachers to help students gain academic content. It can be varied according to teacher beliefs and student learning preferences. Process also may refer to the actual thoughts, emotions, skills, strategies, or other procedures through which one's brain and/or body progresses in order to comprehend information.

Self-efficacy - Self-efficacy is a belief that one can succeed at a given task through the accomplishment of necessary actions and organization (Bandura, 1986).

Task persistence – Task persistence is the ability to concentrate and continue an activity even when it is somewhat difficult. It may be considered synonymous with tenacity or perseverance.

Value – The value of a concept, relationship, or object may be defined as its relative worth, utility, or importance.

Delimitations

The researcher established several delimitations for this study.

- The survey used to gather information for the study was administered to teachers from four elementary schools in the southeastern United States.
- Instructional grade levels at each school were within the range of Kindergarten through fifth grades.
- All teachers represented in the study teach a grade within the range of Kindergarten through fifth grades.

- The schools were selected by the researcher due to similarity of instructional programs, including music, and proximity of location to each other and to the researcher.
- Voluntary participants surveyed included regular classroom teachers, special education teachers, and support teachers, such as the school librarian and physical education teacher.
- The survey completed by the music teacher at each school was utilized only as part of the pilot study.
- The schools from which the teachers were surveyed had similar music programs.
- The study focused on teachers' perceptions and use of instruction through music in a classroom setting.

Assumptions

In relation to this study, the researcher made several assumptions regarding educators. The researcher assumed that the educators participating in the survey were aware that they may utilize music in the elementary classroom for instructional purposes. It was also supposed that the teachers were aware of the existence of research touting the benefits of using music in the classroom. Even if the teachers were not familiar with specific research regarding the benefits of using music in the classroom, it was presumed that they were aware of the existence of these positive aspects. The researcher took for granted that the participating teachers answered honestly regarding their perceptions of the value of instruction through music, their frequency of instruction through music, and their level of musical intelligence. Also, it was implied that the teachers were sufficiently aware of their own strengths and weaknesses to complete the survey.

Justifications

This study was relevant to current curricular concerns regarding the lack of opportunities for elementary students to benefit from musical instruction. With current and future budget reductions in many states, music is often the first educational program to be eliminated (Moran, 2004). If classroom teachers do not use music during instruction, students' educational experiences may be incomplete (Schmidt, 2008). Based on research in self-efficacy, teachers' perceptions of their own musical intelligence impact the use of music in their classroom instruction (Chan, 2003). This research determined teachers' perceptions of the value of instruction through music, the frequency of instruction through music in the participants' classrooms, and teachers' self-evaluated level of musical intelligence. Relationships between these variables were identified and analyzed. The results will contribute to the very limited body of literature related to how teachers' own multiple intelligences and their perceptions of these intelligences impact their instruction.

CHAPTER II

REVIEW OF THE LITERATURE

What we must first seek to answer is whether music is to be placed in education or not, and what power it has....whether as education, play or pastime"

Aristotle

To better understand how and why instruction through music is valuable to students, one first needs an understanding of the learning process. There are many learning theories about how humans gain knowledge. Although this particular study was accomplished through the lens of the Multiple Intelligences Theory, there exist numerous other theories of learning. Regardless of one's preferred or accepted learning theory, the foundation of all knowledge acquisition is a physiological process which takes place in the brain.

Neurological Learning Process

Knowledge acquisition requires the formation of new synaptic connections at a neurological level. The human brain constantly processes and transmits immense amounts of stimuli through neural paths. While only about 10% of the brain is composed of neurons, these essential cells play a major role in human learning (Weinberger, 2000). For the responsibility of transmitting information, neurons rely primarily on their axons and dendrites. The axons' and dendrites' basic functions are as senders and receivers, respectively. The axons conduct information in the form of electrical stimuli within the neuron, then convert the electrical stimuli to chemicals, or neural transmitters (Jensen, 1998). Information conducted via the neural transmitters crosses the synaptic gap, an opening between two neurons, to the dendrite of the next neuron. In other words, the

impulse passes from the neuron cell body to its axon, across the synaptic gap, and to the dendrite of another cell where the pattern of transmission continues (Jensen, 2000). In order to connect with numerous other cells, the axon repeatedly divides itself and branches out to the dendrites of other cells to form a complex neural network. This electrochemical process allows the efficient transmission of messages through the network.

On a subconscious level, the incoming stimuli in the brain get processed, prioritized, stored, or disregarded. When an axon transmits an impulse to the dendrites of other neurons, a connection is formed and therefore knowledge is acquired. The strongest connections are formed when the experience which generates the impulse is both unique and coherent (Jensen, 1998; Kagan, 2001). An incoherent, weak, or boring experience results in a weak neural connection or no connection. Although axons are adaptable and redundant, not all neural transmitters connect to the dendrites of the next neuron. Music can produce the needed pattern of neurons which results in strong, rapid, and sequenced connections (Jensen, 1998).

Most of the billions of excess neurons with which babies are born are not connected to a neural network (Rauscher, 1999). Rapidly formed neural connections are made prenatally and in the early years of life as the child experiences the surrounding world (Gordon, 2003). Researchers now believe that many neurons may be devoted exclusively to music (Gordon, 2003; Weinberger, 2006). Throughout childhood the musically inclined but uncommitted neurons are ready to become part of a specific neural network, but require appropriate experiences in order for the neural organization and commitment to be made (Healy, 1999). "Evidence indicates that music processing occurs

to a limited extent in the third-trimester fetus, in a significant way in newborns, and increasingly so in infants" (Hodges, 2006, p. 3). The "critical periods" of optimal brain development for musical learning probably occur before the end of the first decade of life (Begley, 1996; Gordon, 2003). If children are exposed to musical experiences during this significant timeframe, the previously uncommitted neurons migrate to specific networks in the brain and create permanent circuitry. Without adequate experiences to reinforce and finalize the neuron connections, the neurons may migrate and attach themselves to another area of the brain or may die (Gordon, 2003; Weinberger, 2000; Rauscher, 1999). This process is sometimes referred to as "pruning" (Sousa, 1995).

Final musical pruning occurs between the ages of approximately nine and eleven; neuron circuits that permit perceptual and sensory discrimination of pitch and rhythm are eliminated unless those neural connections have been established (Langstaff & Mayer, 1996). Since it is difficult or impossible for these potential neural connections to be recaptured, peak learning opportunities are diminished (Gordon, 2003). Music learning can occur after pruning; but without those neural connections, it is much more difficult. "No amount of compensatory education at a later time will be able to completely offset the listening handicap" which may impact the child's musical development (Gordon, 2003, p.3).

The Musician's Brain

Neuroimaging data from adult musicians' brains indicated differences in brain morphology compared to non-musicians' brains (Hodges, 2006). In a study at the University of Montreal, Canada, brain-imaging techniques were used to observe musicians' brains while they performed musical tasks. The research found that when

musicians were sight-reading or playing music, regions in all four lobes of the cortex and parts of the cerebellum in the brain were activated (Sergeant, et al.,1992). This activity confirms that music may be processed by neural modules throughout the brain (Weinberger, 2000).

Researchers in Belgium found that compared to non-musicians, the bundle of nerves that connects the two sides of the brain, called the corpus callosum, is much thicker in musicians (Schlaug, as cited in National Association of Music Education, 1994). This main connection between the two hemispheres of the brain is a broad bundle of fibers which carries information from regions of one hemisphere to the other. The thicker fiber bundle signifies greater cross-hemispheric neural connections, which implies consistent use of both the logical and the creative functions of the brain. The differences in the corpus callosum are even greater among those musicians who began an active study of music prior to the age of seven (Hodges, 2006). Possibly this age difference is significant because it indicates strong music connections were made prior to the initial stages of "pruning" in the brain.

Musicians may be particularly good at accessing and integrating information from both hemispheres. Since many instrumental musicians must be able to use both hands independently to play their instruments, they learn to utilize both hemispheres of the brain concurrently. Furthermore, a musician must read the musical symbols, which, like a language, are processed in the left-hemisphere of the brain, the center for logical thinking. While reading the notes, the musician also creates his or her own interpretation of the written music. This skill is linked to the right hemisphere, the brain's center for creativity (Gibson, et al., 2008). The use of both sides of the brain furthers the cross-

hemispheric connections allowing both logical and creative functions. A study by Gibson illustrated how the musician's brain utilizes both hemispheres. In the study, participants were asked to generate non-traditional ways to use common objects. Musicians were able to produce about thirteen more ways than non-musicians. Additionally, musicians performed better on word association tasks. They produced approximately nine more correct answers than others in the study (Gibson, et al., 2008).

Musicians must constantly adjust their actions and decisions based on the tone, style, tempo, rhythm, phrasing, and feeling of the music. These ongoing demands train the musician's brain to become exceedingly good at organizing and conducting numerous activities at once (Ratey, 2001). Dedicated, repeated practice of musical skills may have positive, lifelong results related to intelligence, attention, expression, and self-awareness (Ratey, 2001).

Music and the Brain: Memory

In his book, *Teaching with the Brain in Mind*, Eric Jensen described music as a tool for recall of information or events. Music promotes memory in three ways: "arousal, as a carrier of words, and as a primer for the brain" (Jensen, 1998, p. 37).

Music has well established emotional effects (Osciak & Milheim, 2001). Using music as a means of arousal or stimulation simply means that music affects the release of chemicals in the brain. These chemicals, or neural transmitters, provide transmission of impulses across the brain's neural synaptic gaps. Therefore, music can significantly influence the emotional state of the learner. Music can be used to relax or agitate, invigorate or calm. Were this not so, "then marches would be played as readily at bedtime as at the half-time of football games, dirges would grace weddings," and

"lullabies would be heard at parades" (Weinberger, 1998, p. 1). For this reason, specific tempos and styles of music are played at certain functions or to gain specific results. Upbeat music played at political functions often invokes feelings of patriotism; hymns played at solemn places of worship may provide a more peaceful, reflective tone. Not only does music affect the emotional state of the learner, but "emotions give us a more activated and chemically stimulated brain, which helps us recall things better" (Jensen, 1998, p. 79). Therefore, it is in the best interest of students' learning to engage productive, positive emotions regarding the tasks or topics at hand. When the emotional aspects of what is taught are disregarded, we may be robbing students of meaning and memory (Caine & Caine's study as cited in Jensen, 1998).

In its use as a carrier, the music's melody, created by intervals among notes, not only supplies a medium for words, but also a vehicle for meaning recall (Jensen, 1998). Lyrics of songs sung decades ago still come easily to mind, yet other non-musical groups of words, like the commonly memorized Gettysburg Address, seem to disappear from one's memory. A conventional example among young students is learning the alphabet through listening to and singing the alphabet song. In the same way, song lyrics that describe factual content can help students learn and retain information (Campbell, 1990). For classroom application, information may be taught through songs, rhymes, chants, and raps composed by the teacher. To aid the memory retention of the information, students may also be encouraged to complete a chant, make up a rap, or compose their own lyrics to familiar tunes.

The final category of use is a powerful one; music can actually "prime the brain's neural pathways" (Jensen, 1998, p. 37). Music's capacity to promote neural bonds may

explain why some people associate certain types of music with certain tasks. As simple examples, people often listen to upbeat music when accomplishing chores or listen to relaxing music during dinner conversation. The music may "arouse" the brain by setting the tone, but it also "primes" the neural pathways to prepare the brain for the upcoming task (Jensen, 1998, p. 37). A neural pathway that is used more often than others not only provides a stronger and faster transmission, but also has less interference from other transmissions (Jensen, 1998). The stronger this pattern becomes, the more likely the pattern will be made again. For example, if a student repeatedly listens to Mozart when accomplishing a specific task, improvement in the performance of the task may result. Even weak connections can be fortified through repetition. Therefore, the improvement may not necessarily be due to Mozart's music, but instead to the repetition of the neural pattern created by jointly listening to the familiar music and completing the task. This pattern prepares the pathways in the brain for the type of thinking needed for that particular task.

A relatively new study using brain imaging techniques may help explain this. Neurological researchers at Harvard Medical School and Beth Isreal Deaconess Medical Center have discovered a new ink between actions and sounds (Society for Neuroscience, 2007). The brain quickly makes connections between regions responsible for performing an action and those regions associated with the music or sounds. When listening to a previously learned musical piece, the study participants' brains not only showed activity in the area associated with music and sound, but also in the area related to the movements made while creating the music. The brain showed more activity when listening to music which the person knew how to play compared to equally familiar music the person did

not know how to play. "Mirror neurons" appear make the connection and quickly recall the actions made when prompted by the sound of the music (Society for Neuroscience, 2007). This research has implications for educational settings. Associating music with actions may reinforce memory of specific learning skills. This research supports the research by Janata and Grafton (2003) regarding how music shares neural networks in the brain.

Instruction through music's benefit to memory may be especially valid in relation to today's classroom instructional expectations. During this era of high-stakes testing, educators are faced with a generally accepted viewpoint that all students, regardless of thier ability or skill level, must be prepared for state-mandated tests. With this and other demanding expectations, a primary value of instruction through music in today's classrooms is memory and retention.

Music and the Brain: General Cognition

With a strong electrochemical impulse and a cooperative synapse, a neural connection may be created and knowledge may be acquired. Awareness or perception of that knowledge is cognition—the process of knowing or perceiving. Cognition requires a mental operation which may include the processes of awareness, perception, reasoning, language, recall, and judgment. Cognitive gains occur when the performance of the process impacts mental or cognitive content, the sum of what has been learned.

"The human brain is modularized—meaning that there are relatively separate neural networks for various cognitive domains" (Hodges, 2007, p. 2). These neural networks perform specific functions such as language, sensory, motor, emotions, or memory. Music may be processed throughout the brain by these neural modules

(Weinberger, 2000). Creating music involves interaction of multiple brain modules. As an example, consider some of the processes and skills utilized when playing a musical instrument—recall (keys, notes, sounds); cognition (symbols, score reading); motor skills (fine and gross motor coordination); sensory and perception (auditory, visual, tactile, and kinesthetic); emotions (accomplishing a specific emotional effect); and evaluation of music played (Weinberger, 2000). This integrated process repeats itself frequently, often every few seconds (Weinberger, 2000). According to research by Bloom (1956) and Webb (2005), cognitive processes have varying levels of difficulty. Considered separately, each of these musically related skills utilizes a basic cognitive process which involves obtaining and storing knowledge. When synthesized, these individual basic functions combine into a higher cognitive process, one which puts available knowledge to use through application.

When one considers the complex integration of the brain processes utilized when making music, it is no surprise that Janata and Grafton (2003) found that music may share neural networks with other processes, behaviors, and skills. In addition, synaptic connections made through music training are similar to connections for other skills. This neural sharing and similar synaptic connections may explain why research has frequently found correlations between cognition and music.

Probably the most famous of the "music and the brain" research is now known as the Mozart Effect. Rauscher, Shaw, and Ky (1993) developed research based on a neurobiological model which hypothesized that music would enhance higher brain functions. In their study, one group of college students listened to Mozart's Sonata for Two Pianos in D major for 10 minutes. The two control groups listened to silence or a

recording of relaxation techniques for the same period of time. Immediately after listening, all participants were tested visually on spatial-temporal reasoning using a subtest from the Stanford–Binet Intelligence Scale. The Mozart group experienced an immediate, but short-lived improvement of spatial-temporal reasoning with a typical score 8 to 9 points higher than the other groups. In this study, the researchers only tested adults and their improvement in spatial-temporal reasoning.

This was not the first time that spatial reasoning was found to be related to music. At the Univeristy of Tubingen, Germany, Marianne Hassler had previously discovered a significant relationship between the two variables. Students aged nine to 24 years who scored high on assessments of musical ability also scored high on spatial visualization (Weinberger, 2000). Hassler's study showed correlational, not causal results. However, the findings of Rauscher and colleagues suggested that listening to music actually caused the brain to perform better on spatial reasoning for a short time.

Research regarding the Mozart Effect has continued. McKelvie and Low (2002) attempted to replicate the research with children, but no support for the effect was found in the eleven to thirteen year old group. Rauscher and Shaw's 1997 research was focused on pre-school students participating in keyboard training. Their results showed musical training using a keyboard to be more effective than singing lessons or computer lessons in the development of spatial-temporal reasoning. The improvement lasted for more than one day. The authors of the study suggested that music training produces modifications in neural circuitry in areas of the brain not primarily utilized with music. The researchers may need to consider that unlike the computer lessons or singing lessons, playing the keyboard involves tactile-kinesthetic qualities in conjunction with music. The use of

motor skills, such as finger and arm movements, connecting those movements to specific keys, learning how those keys correspond to specific notes, combined with the tonal quality of the music, may have impacted spatial-temporal reasoning more than non-instrumental forms of music study.

Nantais and Schellenberg (1999) replicated the Mozart Effect, but with changes in the variables: The Mozart sonata and a piano piece by Schubert were compared to silence and then compared to listening to a Stephen King story. They discovered that the Mozart Effect was evident for those participants who preferred Mozart to the story. The effect also occurred among those who listened to the story as long as they enjoyed listening to the story. The authors purport that the Mozart Effect is real, but will occur when any preferred experience causes a more pleasant mood swing.

Music may be considered a unique form of intellect through which one may communicate (Gardner, 1983). Studies show that music performance may develop the intellect. Musical activities may train the brain in aesthetic literacy and perception, imaginative, and visual abilities (Sinatra, 1986). A study in Hong Kong may dispute one of Sinatra's findings. Study participants were ninety six to 15 year old boys in Hong Kong, half with previous musical training consisting of traditional lessons of classical music with violin or flute. The musically trained students also participated in the school band or orchestra. The remainder of the participants had no previous musical training. The groups were congruent in education, intelligence scores, socio-economic levels, and other characteristics. Both groups were given the same assessments. The results showed that those with music training had significantly better verbal memory, but no increase in visual memory (Ho, et al., 2003). Furthermore, the longer the musical training, the more

developed the verbal memory appeared to be. Since the groups were matched in intelligence, the difference in scores could not be attributed to a difference in general intelligence.

At McGill University, Montreal, Canada, research was conducted to study the effects of three years of piano instruction of children's cognitive abilities. Researchers discovered that pattern recognition and mental representation scores improved significantly (Costa-Giomi, 1998). Research from the University of California School of Medicine, San Francisco, indicated that instrumental practice enhances coordination, concentration, memory, improvement of eyesight, and hearing acuity. The research further stated that learning to play an instrument develops and refines the development of the brain and the entire neuromuscular system (Wilson, 1999). A more recent study at the University of Toronto found that after small group keyboard or voice lessons for 36 weeks, the IQ of six year olds rose about seven points. This increase was approximately three points higher than that of students in the concurrent drama related activities or those in the control group who received no lessons (Schellenberg, 2004).

Transfer effects of music on cognition may be more apparent in students who have taken music lessons for an extended period of time. Musical instruction provides a variety of experiences which could elicit improvement in a wide range of skills and abilities. In these lessons students may learn to read musical notation, learn about musical structures such as rests, intervals, and chords, memorize musical passages, master technical skills such as scales or fingering, and gain awareness of the expression of emotions in a performance (Schellenberg, 2004). The combination of experiences may have a positive impact on cognitive skills, especially during the formative years when

"brain development is highly plastic and sensitive to environmental influence" (Schellenberg, 2004, p. 1)

Recently, the impact of music on the brain and cognition has played an important role in the medical field. Patients who listen to music in the early stages after a stroke can improve their recovery. According to Dr. Sarkamo at the University of Helsinki, Finland, 60 patients participated in a single-blind, randomized study. Each had suffered a stroke in the middle cerebral artery in the left or right hemisphere which affected motor control, speech, and cognitive functions such as attention and memory. The patients continued their standard rehabilitative treatments during the study. Those who listened to their favorite music for a couple of hours each day improved their verbal memory by 60%, compared to 18% in those who listened to audio books. There was a 29% increase in the control group who listened to neither. The ability to focus attention also improved seventeen percent in the music group. Furthermore, the music listeners were less confused and exhibited a more positive mood that the other patients (Sarkamo, 2008).

Sixty-three percent of the music chosen by the study participants also contained lyrics. Sarkamo suggested that it is the combination of music and voice which led to the patients' improved memory. He and other researchers of the study concluded that the music enhanced participants' alertness, attention, and mood, directly stimulated the damaged area of the brain, and motivated the brain's plasticity or ability to repair and renew its neural connections (Sarkamo, 2008).

Music and the Brain: Mathematics

"While it would appear that the domains of music and mathematics are widely divergent, an increasing number of studies focusing on participation in musical activity

and cognitive development in mathematics suggest that the two are closely related" (Catterall, et al., 1999, p. 10). Students who report high levels of involvement in instrumental music during the middle and high school years showed significantly higher levels of mathematics proficiency by 12th grade (Catterall, et al., 1999). The music-related math proficiency occurred among all sub-groups and held true for students in a lower socioeconomic subgroup. Among eighth graders, 21.1% of low socioeconomic level music students scored high in math proficiency, but only 10.7% of non-music students in the same subgroup scored high in mathematics. The study also found a direct correlation between the length of time students were actively involved in music and their high level of competence in math. For example, by the time those students were in twelfth grade, the scores for high math proficiency were 33% for music students compared to 15.5% for non-music students (Catterall, et al., 1999).

Another study, conducted in the Albuquerque, New Mexico, public schools, compared all areas of the California Test of Basic Skills (CTBS) for music and non-music students in fifth grade. A correlation was found between the CTBS results and students' length of participation in music. Students active in an instrumental music class for at least two years scored significantly higher than those who had only participated one year (Akin, 1987). Further studies revealed significant relationships between mathematics achievement and music in elementary and high school. Elementary students who received keyboard music lessons scored higher in mathematics and history than students not taking lessons, although the intelligence quotient (IQ) scores of the two groups of students showed no significant difference (ESEA, 1970). Other studies indicated positive correlations between musical and mathematical abilities such as pitch and arithmetic,

tonal relationships and arithmetic and algebra, and sight-singing and arithmetic, algebra, and geometry (Bahna-James, as cited in Catterall, 1999; Klinedinst, 1991).

These wide-ranging results may be surprising until one considers the mathematically related skills found within the study of music. One example is rhythm, a major component of the study of music. Rhythm refers to a pattern of beats occurring over time. In written music, it is depicted by a variety of notes designating time values. Math skills are required to understand the time meaning represented by the notes. These include the ability to count the beats of each given note, the aptitude to understand the absolute value of a note in a measure, and the capacity to grasp the sense of proportion required to understand each note in relation to others (Catterall, 1999). When one considers the overall mathematical skills for this and other components of music, it is easier to accept the expansive correlational results.

Music and the Brain: Reading

Schlaug, Jancke, Huang, & Steinmetz's (1995) study of brain scan results found that musicians' brains showed an increase in size of the planum temporal. This part of the brain is part of a cortical network involved in music processing and language and is specifically related to some reading skills. Therefore, increasing that part of the brain through musical experiences may provide greater support for reading. These physiological results may illuminate the correlations between music and reading.

Numerous studies throughout recent decades have shown correlations between music and reading skills. In a 1981 study, an experimental group of first grade students received Orff-Schulwek-based music lessons (Kelley, 1981). These lessons were based on the work of Carl Orff, who promoted teaching children music using methods to meet

all learning styles. These classes used speech, song, movement, and instruments to promote music literacy. The students receiving these lessons performed better on oral and silent reading than students in the control group who did not receive the music lessons (Kelley, 1981). Further retrospective analysis indicated the additional effects of music as increasing attention skills, the ability to manipulate sounds, and growth in self-concept and cooperation. Individual student analysis showed that the improvements were not simply a result of student growth or maturity, but were truly the result of the music treatment.

Phonemic awareness refers to the perception of the structure of words or how the phonemes or individual sounds are combined to create a word. The level of analysis required for awareness of phonemes is associated with auditory discrimination of sounds. Lamb and Gregory (1993) discerned that children's scores on an assessment of auditory discrimination of pitch were related to their scores on a phonemic awareness test. Therefore, if a child's pitch discrimination is developed due to previous musical experience, that child may more easily gain the phonemic awareness skills required as a precursor for reading.

In a reading and music study of seven and eight year olds, Douglas & Willatts (1994) found a positive correlation between rhythmic ability and reading. The researcher suggested that training in music was an effective strategy for assisting children with reading difficulties. Butzlaff (as cited in Rauscher, 2003) completed a meta-analysis of the results of 24 correlational studies. Some of the correlational studies had sample sizes of over 50,000 students. The results indicated a strong association between reading scores and music instruction.

Friedman(1960) studied the effect of students missing regular classroom instruction time in order to participate in instrumental music classes (1960). He concluded that the loss of regular classroom time did not thwart achievement as measured by the Stanford Achievement Test. The musicians who missed class time maintained reading scores equal to or higher than other students. Additionally, the author observed a significant difference in reading scores between instrumental musicians and students who were not musicians. The musicians had the higher reading scores.

Music and Students' Success in School

According to Whitwell (1977), music improves students' self-image, self-awareness, and creates positive attitudes. A more recent study showed that "music education experiences generally lead to better attendance rates and increased motivation, self-discipline, and cooperation" (Hodges, 2006, p. 4). In a study conducted by the Norwegian Research Council for Science and Humanities, a connection was found between students having high musical competence and high motivation (Lillemyr, 1983). The study showed that musically proficient students were more likely to achieve success in school. Researchers concluded that there is a high correlation between positive self-perception, high cognitive competence scores, self-esteem and interest, and involvement in school music.

However, success in school is not just measured by interest, involvement, and attendance. Ultimately, it is measured through grades and test scores. According to the College Entrance Examination Board, college-bound seniors with experience or coursework in music performance scored an average of 57 points higher on the Verbal and 41 points higher in Mathematics on the Stanford Achievement Test (SAT) than

students with no music participation (College Bound Seniors, 1991). In 1981 at a large high school in southern California, the overall grade point average (GPA) of music students was 3.59 on a 4.0 scale. The GPA of non-music students was 2.91. This study also noted that 16% of music students had attained a 4.0 GPA, while only 5 % of the non-music students had an overall 4.0 GPA (Mickela, n.d.). Similar results were indicated in data from the National Education Longitudinal Study (1990). Music participants received more awards and academic honors than non-music students. In addition, the study showed that the percentage of music students receiving honor roll grades—As and/or Bs—was higher than the percentage of non-musical participants (1990).

In analyzing the information from these correlational studies, one must consider viewing the results from a different perspective. Learning across disciplines implies that one discipline reinforces or deepens learning in the other. If one views this pragmatically, it must be accepted that music was not alone in creating the correlations. Therefore, just as academic performance may have benefited from instruction in music, music may have benefited from strong instruction in academic subjects.

Music and Attitudes

Dr. Chesky and others (1998) at the University of Texas completed a study of college-age students. The results indicated that college music students have fewer problems with alcohol, are emotionally healthier, and concentrate better than their non-musical counterparts. Most college music students are involved in voice or instrumental performance and music theory lessons. The voice and instrumental practice may be solo or with an ensemble, choir, or orchestra. Musical selections typically range from Italian opera to classical and baroque. Certainly, there are exceptions to these statements.

However, the typical collegiate pupil who actively studies music may be actively listening to genres much different from the self-selected music choices of other members of his or her age group.

Just as the music studied by college students may impact their actions, so too does the popular music of the day. A study of over 1,000 community college students and their preferred music showed correlations between music and actions. Listening to rap, techno, and reggae music containing references to substance abuse and violence was positively associated with "problematic alcohol use, illicit drug use, and aggressive behaviors when all other variables were controlled" (Chen, et al., 2006, p.1). Other styles of music, such as country, alternative rock, blues, and jazz, had fewer references to alcohol, illegal substances, and aggressive behaviors. These types of music shows no significant correlations with negative behaviors.

The results of another study related to music listening are very telling. Dr. Steven Buka of Harvard School of Public Health and Dr. Lewis Lipsitt of Brown University have developed a longitudinal database founded on a study began in Providence, Rhode Island about 40 years ago (Gardiner, 2000). Data on over 500 subjects begins with prenatal records and extends to subjects' current lives. Database information included interests in music and music training. This study's results show that the probability of having been arrested at least once by age 18 was lessened with interest in music and dropped even further as musical skill level and interest increases. Those study participants with the higher arrest records had indicated that they did not like to listen to music. The results of this study provided even greater purpose for music instruction in the regular classroom setting. Cultivating an appreciation of music—even without learning to

create music—may be important to one's most basic human development (Gardiner, 2000).

History of Intelligence Measures

The search for a method to measure and compare cognitive abilities is far from new. As long ago as 2200 B.C, Chinese emperors used "aptitude" testing for civil servants (Machek, 2003). It is only in recent years that an evaluation instrument was developed and used as a standard measure of general intelligence. Up through the 19th century, psychologists had attempted to measure intelligence based on physical features or actions (Johnston, 1997). For example, Sir Francis Galton studied variations in human ability as measured through physical attributes such as head size (Machek, 2003; Johnston, 1997). Galton's own small head convinced him that head size alone was not a perfect indicator of ability. Therefore, he conducted further "mental" tests of sensory discrimination, motor coordination, and reaction time to stimuli. During the late 19th and early 20th centuries, often considered the zenith of the psychometric and behaviorist periods (Johnston, 1997), intelligence was considered a unitary, inherited factor. Then in 1905, French psychologists, Alfred Binet and Theodore Simon, developed and published the first, modern intelligence test (Gardner, 1993).

In the year preceding the publication of the Simon-Binet intelligence test, the French government had assigned Binet the task of investigating the intelligence levels of mentally challenged students. This first intelligence test was devised to distinguish between mentally subnormal children and normal children. The design of the test items was directed by a simple premise: measurement with respect to age. Binet found that a subnormal child's performance may be considered equivalent to that of a younger child

with normal intelligence. Later, Binet paired with Simon in the continued development of intelligence testing. In later revisions, they included test items to correspond and measure concepts appropriate for specific mental ages (Johnston, 1997).

Despite his single-score test and the generally accepted belief of a sole, inherited mentality, Alfred Binet believed that one's intelligence was malleable. He did not accept the hereditary view of his day, nor did he condone a single measure of intelligence. After various, wide-ranging observations of his two daughters, Binet believed that intelligence could be manifested through various means (Johnston, 1997). Binet wrote:

> This scale properly speaking does not permit the measure of the intelligence, because intellectual qualities are not superposable, and therefore cannot be measured as linear surfaces are measured, but are on the contrary, a classification, a hierarchy among diverse intelligences. (Binet, 1905, p.3)

Multiple Intelligences

Howard Gardner challenged the historically accepted concept of a singular human intelligence encompassing all areas of human competence. In 1983, he proposed that intelligence is not unitary. Instead of a single entity, he theorized a pluralistic intelligence consisting of numerous intelligence areas each with the potential to implement and carry out a set of intellectual talents (Gardner, 1993). Gardner defined intelligence as an ability to solve problems or create products which have value or worth in one or more cultural setting (Gardner & Hatch, 1989).

Gardner argued that intelligence is rooted in biology. Neurobiological research shows that various types of learning result from synaptic connections in different modules or areas of the brain (Hodges, 2007). The more frequently one's environment

includes and engages the learner in the skills and concepts representative of that intelligence, the more entrenched become the corresponding synaptic pathways (Jensen, 1998). With consistent use of synaptic pathways, faster and stronger neural connections will occur (Jensen, 1998), leading to cognition. Logically, it follows that stronger connections result in a greater development of that part of the brain, and potentially, an increased intelligence in that area. Therefore, the biology of brain development does help determine one's intelligences.

According to Gardner (1983), along with a biological basis for intelligence, there is also a cultural basis. Societies differ in the value placed on certain intelligences. The cultural emphasis placed on an intelligence may provide the motivation for members of that culture to become proficient in that area. Therefore, a particular intelligence may be highly developed within the population of one culture, but may be much less advanced in individuals of another. For example, people living in rural, primarily agrarian cultures may be expected to be aware and knowledgeable of the native flora and their uses. Due to this cultural expectation, these people may be more likely to develop a naturalistic intelligence than people living in urban cultures.

Gardner's theory argued that traditionally defined intelligence does not satisfactorily encompass the great range of human abilities. "a prerequisite for a theory of multiple intelligences, as a whole, is that it captures a reasonably complete gamut of the kinds of abilities valued by human cultures" (Gardner, 1983, p. 62). Gardner attempted a paradigm shift regarding intellect and defined it in a much broader way than the typical unitary intelligence theory. He established two primary prerequisites for intelligences: the ability to solve real problems and to create an effective product. Over and above these,

Gardner used eight additional criteria as proof of each intelligence's existence. He admitted that making decisions about whether intelligence candidates meet the range of criteria was "more of an artistic judgment than a scientific assessment" (Gardner, 1983, p. 63). The criteria were:

- Potential isolation by brain damage; intelligence function identified in a specific location in the brain.
- Existence of idiot savants, child prodigies, or other exceptional individuals.
- An identifiable core operation or set of operations which are basic information-processing mechanisms.
- Distinctive developmental stages or history along with a definable set of 'end-state' or mastery performances.
- Evolutionary history and evolutionary plausibility; intelligence can be traced evolutionarily.
- Support from experimental psychological tasks; intelligence can be identified by specific tasks which can be observed and measured.
- Support from psychometric findings; tests can measure unique intelligences.
- Susceptibility to encoding in a symbol system; intelligence has its own set of unique images or representations needed to complete its tasks.

(Gardner, 1983)

Howard Gardner originally posited seven multiple intelligences; later, he added an eighth intelligence. Instead of defining intelligence primarily as a combination of verbal and mathematical aptitudes, the Theory of Multiple Intelligences (Hatch & Gardner, 1996) identified intelligences as follows:

Linguistic Intelligence – involves language mastery: sensitivity to the sounds, rhythms, and meanings of words; sensitivity to the different functions of language; ability to manipulate language to express oneself in different forms, such as poetically; use of language as a means to remember information and solve problems.

Musical Intelligence – encompasses music related abilities: to recognize, compose, and appreciate musical rhythm, tones, and timbre; appreciation of the forms of musical expressiveness; use of music to solve problems.

Logical-Mathematical Intelligence – comprises sensitivity or ability related to patterns, orderliness, and systems; ability to handle complex deductive and inductive reasoning; use of logical thinking to solve problems.

Spatial Intelligence – includes the ability to create and manipulate mental images in order to solve problems; capacities to perceive and recreate the spatial world accurately, to perform transformations on ones' initial perceptions.

Bodily-Kinesthetic Intelligence – involves abilities to control one's body movements and to handle objects skillfully; use of movement to solve problems.

Interpersonal Intelligence – encompasses capacities to discern and respond appropriately to the moods, temperaments, motivations, intentions, and desires of other people.

Intrapersonal Intelligence – includes access to one's own feelings, the ability to discriminate among them and draw upon them to guide behavior.

Naturalistic Intelligence – involves the capacity to draw on materials and features of the natural environment to solve problems or fashion products

(Gardner, 1983, 1993; Gardner & Hatch, 1996)

Musical Intelligence

Students possessing musical intelligence appreciate forms of musical expression. They can produce, communicate, and learn through the use of rhythm, pitch, and timbre. Musically intelligent pupils may be those who use a pencil to tap out rhythms on their desk, hum frequently, or are particularly interested in the sounds of the birds outside. A student who is musically talented may readily create his or her own songs and chants.

Two important aspects of the Multiple Intelligences (MI) Theory had significant influence on the nature of musical intelligence and on this study. First was the premise that aptitudes can be developed or learned through practice, training, and schooling (Gardner, 1993). Many people, including educators, perceive musical intelligence as a talent or gift stemming from a natural ability (Gardner, 1993). However, in MI Theory, if someone learns to play a musical instrument, the knowledge acquired is in the domain of musical intelligence, just as learning to solve mathematical equations would be part of logical-mathematical intelligence.

Another important aspect was the assertion that each intelligence may serve as a means of transmission, often referred to as an entry point for learning content (Gardner, 1993). "MI theory holds that the nurturing and development that takes place in musical learning is autonomous and on par with the processes that take place in studying languages, mathematics and the sciences" (Potter, 1997, p. 3). "Thus, musical intelligence (like all intelligences) can serve as both form or means of learning, and message or content learned" (Gardner, 1993, p. 334).

Although the Multiple Intelligences Theory does not offer a particular set of activities for teachers to follow, the concept of multiple intelligences does have

implications for classroom practice. Each person possesses varying or changeable degrees of each area of intelligence (Gardner, 1983). The intelligences, manifested as different areas of strengths, operate in combination with each other to create a unique intelligence profile for each individual (Harvard Project Zero, 2005). For example, an accomplished dancer may possess several strong intelligences: musical intelligence allowing an understanding of the rhythmic and tonal variations in music, bodily-kinesthetic intelligence which provides physical agility and coordination needed for successful movements, and interpersonal intelligence to understand how his or her movements can inspire or impact others.

If one applies this theoretical framework to students, then each student possesses varying degrees of each area of intelligence. One may assume that each student has a distinctive identity based on his or her multiple intelligences. This intelligence identity may help determine how easy or difficult it is for a student to learn information presented in a particular way. In order to improve the quality of student learning, it is necessary for teachers to utilize strategies and approaches which provide students with opportunities to learn through their individual intelligence strengths. "For example, the teacher can suggest that an especially musically intelligent child learn about the revolutionary war by making up a song about what happened" (Brualdi, 1996, p. 3). However, students, regardless of their level of musical intelligence, may best learn through music by creating, performing, and active listening because each student possesses some level of musical intelligence.

Teachers may assume that listening to background music while working on an unrelated task is sufficient to meet the needs of musically inclined students. Just the

opposite may be true. Background music may be a serious distraction for students who are drawn to the music when they should be focused on something else (Harvard Project Zero, 2005, p. 4). On the other hand, for most students it becomes background noise, barely noticed. If selective in when and how they offer music for listening and by providing purpose and direction, teachers may create an environment in which actively listening to music may be beneficial to students (Harvard Project Zero, 2005).

Gardner (2001) maintained that learners succeed best when learning is accomplished through a variety of intelligences. He stated that all intelligences are needed to productively function in society. Therefore, teachers should think of all intelligences as equally important (Gardner, 1991). Gardner referred to those learning environments that address a limited range of intelligences as "half-brained" (Gardner, 2002, p. 3). According to Boyer, since music is a powerful way of learning for some learners, for teachers music should be an on-going, significant way of teaching (Boyer, 1983). In other words, if all students have a degree of musical intelligence, then music should be used to enhance instruction. When important ideas, information, and ways of thinking can be approached through musical or rhythmic entry points, the strategies and structures provided by music may initiate or reinforce the learning. Furthermore, because music can help some people organize the way they think, it can help them develop in other areas such as language, spatial reasoning, and math (Gardner, 1997).

Music as an Entry Point

Gardner's Theory of Multiple Intelligences acknowledges that people learn, represent, and utilize knowledge in many different ways. Each individual has a preferable way through which he or she best learns, understands, and remembers. Typically one's

most productive means of learning is through previous knowledge in an area of strength or dominant Multiple Intelligence. Gardner (1983) refers to this gateway to learning as an "entry point" and states that instruction provided through a student's entry point or dominant Multiple Intelligence enables enhanced understanding of academic content.

However, correlations exist between and among each individual's Multiple Intelligences. In other words, individuals usually have more than one area of strength or more than one relatively dominant Multiple Intelligence. Intelligences work in connection with one another, allowing individuals to learn information using a variety of intelligences depending on the content to be learned (Gardner, 1983). For example, a student may create rhymes or chants to aid in remembering biology content. Another pupil may rely on Bodily-kinesthetic Intelligence when doing simple hand motions as a mnemonic device for recall of terms and definitions in English. For some topics or areas of learning, more than one intelligence may be used to gain and represent knowledge. Using his or her Linguistic Intelligence, a student may gain content from reading and discussing history. Then the student may use his or her Spatial-temporal Intelligence to represent that historical content in the creation of a timeline. For a math activity, a young student may rely on Bodily-kinesthetic and Interpersonal Intelligences as he or she works with others to use manipulatives in order to solve equations. When learning a game such as basketball, a student may use Spatial-temporal, Interpersonal, and Bodily-kinesthetic Intelligences. Individuals use a variety of intelligences to learn diverse content. These individual preferences create a unique profile of intelligences for each learner (Gardner, 1983). "Students learn in ways that are identifiably distinctive" (Gardner, 1991, p.12). Therefore, true understanding of content may be best achieved if numerous entry points

using an assortment of intelligences were utilized for each instructional concept (Armstrong, 1994).

Using music as an entry point for learning was exemplified through the work of Dr. Lassar Golkin. He discovered that students who were struggling to learn concepts in a traditional, instructional setting were able to easily learn the same concepts through musically based games and "street play." He found that the musical games taught fundamental concepts to the children in his program even when conventional instructional methods did not (Hillery, 1979). The musical intelligence of the students served as the entry point for learning.

For some learners, music may be the primary gateway or "entry point" for learning (Gardner, 1993). Those students with developed musical intelligence may learn best through musically-based instructional strategies and activities. Learning through music affords one many opportunities to gain awareness and knowledge in other disciplines. The exploration of rhythmic notation and time signatures may enable students to better understand fractions. Studying the sounds of string instruments can lead to greater curiosity and comprehension of vibration modes in physics. Students counting the beats in a simple melody may gain a better understanding of number concept. Identifying patterns and sequences in music may lead children to recognize patterns and sequences in other subjects. Students studying a time period in history may gain a broader perspective of the era by listening to and learning about the music common during that time. Some musical pieces, such as Peter and the Wolf by Sergei Prokofiev, tell a story through the use of changes in the music's tone, rhythm, and tempo. In addition to examples such as these, music can stimulate one's memory, develop other cognitive skills, and help

students learn a plethora of non-music related information (Jensen, 1998).

Differentiated Instruction

Gardner's (2001) ideas were significant for the relationship of music to instruction in other areas. He maintained that students succeed at learning complex ideas and processes when experienced through a variety of intelligences. In order to accomplish this goal within classroom instruction, teachers must consider the strengths and weaknesses of each student's intelligences. This thoughtful consideration of each student is an inherent part of the process of differentiated instruction. Differentiated instruction is based on the premise that a teacher's instructional approaches should vary in order to best meet the needs of each individual student (Tomlinson, 1995). The purpose of this practice is to maximize students' growth and success by meeting each student at his or her level of instruction while considering other individual factors (Willis & Mann, 2000). Rather than uniform instruction and assignments for all pupils, teachers using differentiated instruction modify their teaching to accommodate diversity among students. In order to teach responsively, this method requires recognition of students' varying background knowledge, readiness levels, interests, language, learning preferences or styles, and entry points of various intelligences.

Tomlinson (1995) has identified three primary elements which may be differentiated during instruction. These are content, process, and product. The first element, content, includes the concepts, principles, and skills that students are to learn. Due to time constraints and complexity of lesson plans, it would be impractical or perhaps impossible for teachers to provide quality instruction on different content for each student. In order for teachers to accomplish differentiated instruction, Tomlinson

suggested that teachers address the same content with all students. Yet, the teacher must adapt instruction to meet student needs through differences in method of delivery, level of difficulty, and scaffolding. Content also includes the means with which teachers impart information, such as demonstrations, lectures, and films.

According to Tomlinson (1995), the second element of differentiated instruction, process, refers to the methods, strategies, or management techniques used by the teacher to instruct students. Tomlinson stated that educators must use instruction and management strategies which best meet the needs of their students. Typical teacher processes used to instruct students include lectures, computer-assisted instruction, or having students read the material. However, not all students may respond well to these traditional methods. Some students may learn best when allowed to work and collaborate in a small group or with a partner.

The final component of differentiated instruction is products. Products are assessments, projects, or other assignments which allow students to demonstrate their knowledge. In order to achieve meaningful learner products during differentiated instruction, teachers must incorporate a variety of assignments and effective use of recursive assessment results, including valid pre-tests and on-going, varied assessments (Willis & Mann, 2000).

In the book *Classroom Instruction That Works,* Robert Marzano (2001) and colleagues identified nine instructional strategies which have been proven to enhance learning and improve student achievement. These nine strategies are derived from synthesized research from Mid-continent Research for Education and Learning. These strategies may be used across grade levels and lend themselves to differentiated

instruction. They are: identifying similarities and differences; summarizing and note taking; reinforcing effort and providing recognition; homework and practice; nonlinguistic representations; cooperative learning; setting objectives and providing feedback; generating and testing hypotheses; and cues, questions, and advance organizers. Some of these strategies may be accomplished through the use of music. For example, students may identify similarities and differences in music passages. Reinforcement and recognition may be provided through the use of music in the classroom. A student with a strong musical intelligence may utilize music as a form of nonlinguistic representation. Music may be used in cooperative games and activities, plus students could cooperatively plan strategies involving music. When listening to a new musical selection, students could predict or hypothesize the tone, rhythm, or pattern of the upcoming passage. These are just a few examples of ways in which Marzano's instructional strategies may be used as a part of differentiated instruction.

Teacher Efficacy

Classroom teachers, especially those attempting differentiated instruction, make frequent instructional decisions based on their background knowledge. Educators make classroom instructional decisions founded on personal beliefs, pedagogical theories, content knowledge, and familiar teaching strategies (Ross, Cornett, & McCutcheon, 1992). This is consistent with research by Wood, Cobb, & Yackel (1990, as cited in Morgan, 2008) which described how educators' attitudes toward teaching may vary according to their beliefs and perceptions of the subject.

Regardless of one's knowledge base, a teacher may not believe he or she is capable of performing the actions necessary to provide instructional practice which

would positively affect student performance (Guskey, 2001). A teacher with limited background knowledge in a specific area or intelligence may not include related teaching strategies as a means of learning (Kane, 2005). Based on research in self-referent thought, self-efficacy is a personal judgment based on one's perceptions of competence rather than one's actual level of competence (Bandura, 1986, 1997). The use of one's capabilities may be determined by the self-confidence with which individuals attempt and handle difficult tasks (Bandura, 1997). Self-efficacy plays a major role not only in how one feels and thinks, but also how one behaves and self-motivates. Personal beliefs about individual capabilities, whether positive or negative, are better predictors of behavior and actions than that of which one is actually capable. In other words, people's actions reflect their beliefs about what they can do (Bandura, as cited in Rumsey, Walker, & Harris, 1994).

In recent years, efficacy related to teachers appears to be more prevalent in educational research. Kane described teacher efficacy as a "powerful construct which can influence student learning and teacher behavior in the classroom" (Kane, 2005, p. 2). Teacher's perceptions of self-efficacy are considered an important element of effective teaching (Kane, 2005). However, the level of efficacy toward general teaching is not always the same as that of specific subject matter. For example, in a study by DeLaat and Watters (1995), teachers who were highly competent in general teaching skills displayed low levels of perceived efficacy in relation to teaching science. Educators utilize more classroom time teaching subject content in which their sense of self-efficacy is higher (Riggs & Enoch, 1990). The reverse is also true. In those subject areas in which teachers have a lower sense of self-efficacy, teachers actually avoid instruction (Riggs, 1995).

Effective instruction in any subject matter is affected or determined by the teacher's pedagogical choices, personal theories, and beliefs (Ross, Cornett, & McCutcheon, 1992). These instructional choices may be defined or impacted, at least in part, by the teacher's self-efficacy. However, teachers do not always have the luxury of teaching only subjects for which they have a strong sense of efficacy. Economic and cultural norms or changes may require teachers to teach outside or beyond their comfort zone. In today's pragmatic educational atmosphere, classroom teachers may be expected to include the arts, such as music, in their regular classroom instruction. Yet, many capable classroom teachers express an uncertainty in their ability to teach music or other arts (Kane, 2005). Although they may believe that certain practices, such as including music in classroom instruction, will positively affect student accomplishments, these same teachers may not believe that they are capable of performing the necessary behaviors to provide these practices (Guskey, 2001).

Teacher Intelligences Related to Strengths in Teaching

Much has been written about applying Gardner's Multiple Intelligence Theory to classroom practice. Teachers have been encouraged to determine how students learn based on dominant multiple intelligences and how they, as educators, can use knowledge of multiple intelligences to improve their classroom practice. Yet, research has all but ignored the possibility that a teacher's instruction may be impacted due to his or her own intelligences. A teacher's self-perception of strengths or weaknesses in areas of various intelligences may affect the teacher's efficacy or confidence in his or her ability to promote student learning in those areas (Chan, 2003). For example, teachers with low levels of self-perceived efficacy related to teaching music in the regular classroom have

been shown to be less effective in their ability to teach music (Bartel & Cameron, 2002).

Considering the self-efficacy research of Chan and Bandura, it is feasible to deduce that teachers who perceive themselves as musically intelligent are more likely to utilize music and instruction through music in their classroom teaching. Therefore, if teachers recognize their multiple intelligences' strengths and weaknesses, they can identify areas for enhancement in order to improve their classroom practice. Less developed intelligences and core skills may be expanded through practice and training (Gardner 1993).

In a study of secondary teachers, Chan found that most teachers self-reported person-related intelligences as strengths (2003). Teachers worked closely with students and other teachers, which is typical of interpersonal intelligence. Additionally, educators are often strong in intrapersonal contexts such as reflective practices. In Chan's study, language teachers scored highest on verbal-linguistic, math teachers scored highest on logical mathematical and spatial-temporal intelligence. Other teachers rated themselves highest in an intelligence closely matching their teaching practice (Chan, 2003). For example, the music teacher scored highest in musical intelligence and the physical education teacher scored well in spatial-temporal and bodily-kinesthetic.

According to Chan (2003), teachers limited in their own profile of intelligences may restrict themselves to the teaching methods they find familiar or comfortable without attempting new strategies. Because teachers are not always aware of their intelligences' strengths and weaknesses, they may assume teaching responsibilities inconsistent with their abilities (Chan, 2003). This inconsistency in abilities and the requirements of the teaching position may create further setbacks to one's feelings of efficacy.

> "Thus, teachers need to identify their own strengths as well as their frequently overlooked and underdeveloped intelligences, and integrate them into their teaching, the better to engage their own as well as their students' full spectrum of multiple intelligences and learning strategies" (Chan, 2003, p. 522).

Educators need assistance with this huge undertaking. Schools, districts, and college or university teacher preparation programs need to "aim for a more balanced development in teacher multiple intelligences" (Chan, 2003, p. 531).

Professional Development

Guskey (2000) defines professional development as "those processes and activities designed to enhance professional knowledge, skills, and attitudes of educators so that they might, in turn, improve the learning of students" (p. 16). Based on this definition, the goal of professional development is to improve student learning. Therefore, in order for professional development to be successful there must exist the transfer or application of knowledge and skills of the teacher to the student (Broad & Newstrom, 1992). Guskey and Sparks, (1996) further asserted that if increased student achievement was an important objective, then a quality professional development program was necessary.

In general, there appears to be a minimal amount of research which actually assesses the impact of professional development programs on classroom practices and student achievement (Killion, 1998). Many districts evaluate their professional development programs on teacher reactions rather than the teachers' level of implementation or the measurable effect on student learning (Guskey, 2000). Determining the amount of transfer of professional development strategies into classroom

use is extremely difficult and is rarely completed by school districts (Guskey, 2000; Killion, 1998). Although limited in number, there are studies which make this connection.

In a national study of over 1,000 math and science teachers, researchers found that on-going and intensive professional development has a greater likelihood of enhancing teacher skills, knowledge, and attitudes than shorter, "one shot" professional development opportunities. Ultimately, the improvement of teachers' skills and knowledge transfers into greater student achievement (Garet, et al., 2001). Also, professional development that is focused on one area, subject, or discipline has a greater likelihood of becoming an integrated part of the teachers' and students' daily school life. This provides teachers with more opportunities to put into place the skills and knowledge learned. Therefore, those learning opportunities for teachers which most closely relate to the curriculum being taught have been proved to be most likely to enhance student learning (Garet, 2001).

A 1998 study involving more than a half million students in 3,000 elementary and middle schools in Texas linked professional development to student learning. "The results show large differences among teachers in their impacts on student achievement" Hanushek, et al., 1998, p.4). However, these differences were not easily measured teacher or classroom characteristics. Education and experience appeared to have little impact on teacher quality. Although small class size did have a small effect on achievement, this effect was minor compared to the impact of the teacher. The results of this research showed that the most important factor in student achievement was teacher quality (Hanushek, et al., 1998). If one considers this statement applicable to all areas of

teaching, then it follows that the teacher is the most important factor in student achievement of instruction through music.

Conclusion

Some modern cultures do now require music instruction as a core subject. In top ranked academic countries, such as Japan, the Netherlands, and Hungary, music plays a central role in instruction. With strong commitments to music education, each requires vocal and instrumental music training at the elementary and middle school levels. Students of these three countries consistently score high in mathematics and science. The focus on music in these cultures seems contradictory to the United States' lack of focus on music, instead concentrating on math, science, vocabulary, and technology (IAEEA, 1988).

Since the focus on music as a core subject is not a current educational reality in today's society, teachers may take advantage of opportunities to use music in conjunction with and as a medium for other subject matter. Strategies involving music, songs, simple instruments, and rhythmic activities may be accomplished through integration of music within other areas of the curriculum. These approaches provide a basic musical foundation in rhythm and tone for students. As pupils progress in age, those strategies may continue to set the tone of the classroom, serve as mnemonic devices, and provide opportunities for further musical instruction. Based on the results of the study reported by Gardiner (2000), these simple activities may not only be vital in encouraging the appreciation of music, but may ensure a more positive outlook and life in later years.

CHAPTER III

METHODOLOGY

The primary purpose of this study was to examine elementary educators' perceptions and practices related to instruction though music. Instruction through music is the active use of songs, rhythmic activities, instruments, or other musical forms as a relevant part of classroom instruction across disciplines. The use of music may set an appropriate tone or mood for classroom instruction, establish interdisciplinary connections, and impart or reinforce subject matter (Jensen, 1998). Instruction through music is two-fold. It represents the use of music as an integral part of instruction in other subject areas, but also encompasses more traditional teaching including music and musical concepts such as tone, pitch, and rhythm.

In his book, *Frames of Mind: A Theory of Multiple Intelligences*, Howard Gardner defines a new paradigm in human intelligence. Not accepting the commonly held view of a single, unitary intelligence, Gardner proposed that human intelligence is pluralistic, consisting of numerous intelligence areas each with the potential to carry out intellectual talents (Gardner, 1993). Gardner's defines intelligence as the ability to solve problems or create products which are of value or worth in one or more cultural settings (Gardner & Hatch, 1989). Intelligences are considered ways to demonstrate, represent, and further one's intellectual ability through the acquisition of new knowledge (Gardner, 1983). Gardner's Theory encompasses at least eight intelligences: linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, naturalist, interpersonal, and intrapersonal. Table 2 provides a brief description of each intelligence:

Table 2

Descriptions of Multiple Intelligences

Intelligence	Description
Bodily-kinesthetic	Involves body movements to solve problems, create things, and convey ideas and emotions; ability to control one's body and handle objects skillfully.
Interpersonal	Refers to the ability to work effectively with others, to recognize, understand, and respond appropriately to their moods, temperaments, motivations, intentions, and goals.
Intrapersonal	Refers to the ability to understand one's own emotions, goals, and intentions; the ability to discriminate among one's feelings and use them to guide behavior.
Verbal-linguistic	Involves producing language, sensitivity to the nuances, order, rhythm of words, and the different functions of language; ability to manipulate language to express oneself in different forms; use of language as a means to remember information and solve problems.
Logical-mathematical	Includes the ability to reason deductively or inductively and to recognize and manipulate patterns, systems, and relationships; use of logical thinking to solve problems.
Musical	Encompasses sensitivity to pitch, timbre, and rhythm; responsiveness to the emotions of music elements; abilities to recognize, appreciate, and/or compose music.
Naturalist	The latest intelligence added; includes the capacity to recognize flora and fauna, make distinctions in the natural world, and use the ability productively in activities or to create products.
Spatial-temporal	Includes the ability to create and manipulate images and representations of the world and to transfer them mentally or concretely.

(Gardner, 1983, 1993, 2001; Gardner & Hatch, 1989)

This correlational study examined and analyzed relationships between pairs of the following variables: elementary teachers' perceptions of the value of instruction through music, their self-reported frequency of instruction through music, and their self-evaluated level of musical intelligence. Data were collected through a two-part instrument conducted during the 2008-2009 academic year. Primarily, the purpose of the first component was to determine teachers' perceptions regarding the value of instruction through music and to identify the frequency with which teachers provide instruction through music in their classrooms. Additionally, a portion of the initial component ascertained how teachers used music and which music practices were most prevalent in their classrooms. The second component of the questionnaire allowed participants to self-evaluate their multiple intelligences. Participants' dominant intelligences were identified relative to the group of eight multiple intelligences. More specifically, the second component determined the relative musical intelligence for each participant.

Research Design

The three primary variables of this study were the participants' self-evaluated level of musical intelligence; the participants' perception of the value of music instruction in the classroom; and the participants' self-reported frequency of classroom instruction through music. Since each of these three variables may have impacted the others, independent and dependent variables were not identified. Data for each of the three variables were collected only once during the study.

In descriptive research, a correlational study may be used in quantitative measures for two or more variables. The purpose of correlational research is to determine if there is a relationship or covariance between or among the variables. Bivariate analysis is used

when determining the statistical, linear correlation between two variables. Although there were three main variables for this study, correlations were sought between pairs of the primary variables. In other words, each variable was separately compared to each of the other individual variables. Therefore, bivariate analyses using Pearson's product moment correlation (Pearson's correlation) were used for this correlational study.

Participants

The two-part instrument was administered to 87 Kindergarten through fifth grade teachers at four elementary schools in the southeastern United States. Voluntary participants included regular classroom teachers, special education teachers, and teachers of support classes such as the school librarian and physical education teacher. Most study participants were female, with ages between the early twenties and late fifties, and a range of teaching experience from one to 30 years. These teachers were asked to participate due to the proximity of their schools to each other and to the researcher.

The elementary schools of the participating teachers had many similarities. The schools were located in the same geographic area with teachers from similar socioeconomic backgrounds. Each elementary school's instructional grade levels were within the range of Kindergarten through fifth grades. Since the elementary schools were all located in the same state, the teachers at each school were required to utilize the curriculum guidelines set forth by the state department of education. With the same core curriculum, the teachers from each of the schools often attended the same or similar professional development trainings. Therefore, the faculty of each school had comparable influences on their pedagogy and practice.

Although the elementary schools were not all located in the same school district,

they had similar music programs. One music teacher at each school presented music instruction to each class one or two times a week. The music teacher's instruction focused on music, therefore he or she did not complete the questionnaire as part of the study.

Instrumentation

The initial portion of the survey instrument included questions of general information (Appendix A). These questions garnered information about length of teaching experience, college and professional development experiences, and subjects or grades taught. In addition to the general information section, the instrument had two primary components. For each of the two components, a questionnaire was developed and presented consisting of Likert scale questions. Participants were asked to select the appropriate number which corresponded to their response for each question. The first component measured participants' perceptions of the value of instruction through music and frequency of instruction through music. In addition, the initial component included classroom instruction questions which were used to determine prevalent methods and use of music in the classroom. The second part of the instrument consisted of eight summated scales, each relating to one of Gardner's Multiple Intelligences. The questions for each intelligence area were interspersed to create a composite scale with which teachers could self-evaluate their multiple intelligences.

Prior to its use for this study, the two-part questionnaire was evaluated by a team of experts. These experts completed a Validity Questionnaire (Appendix B) and assessed the questionnaire for overall readability levels, ease of completion, content clarity, and relevance of questions. This committee of experts consisted of three members. One

member was a Lead Teacher at a nearby elementary school. She is a former university instructor through the Barksdale Reading Institute and holds a doctorate in educational leadership. Another expert, a musician with a Bachelor of Arts degree, was chosen not only because of his extensive musical background but also because he is an experienced writer. In addition, his work relating to sleep disorders at a major university medical center has led to his study of neurology and the brain. A third expert was a former principal with a doctorate in educational leadership. She has served as an advocate, mentor, and trainer to National Board Certified Teacher Candidates and has promoted the integration of arts into the elementary curriculum. Each member of the committee of experts asked pertinent questions and made valuable suggestions regarding the content of the survey. Based on their comments, some survey questions were eliminated or combined, while others were rewritten to assure a well-developed product.

After its assessment by the expert committee, the questionnaire was then evaluated through a pilot study. Teachers involved in the pilot study, including the music teachers of the participating schools, did not participate in the research study. The pilot study teachers completed the survey in order to provide specific feedback on the contents' clarity and relevance of questions, as well as ease of completion and overall readability. The pilot study resulted in minor recommendations regarding word usage and sentence comprehension. These changes were adapted to create the final survey.

Before the questionnaire was used in the study, it was important to consider the validity of the instrument. The pertinent feedback and recommendations received from the committee of experts and the teachers of the pilot study assisted the researcher in implementing necessary changes in order to attain instrument validity.

In order to determine the reliability or internal consistency of the survey questions, Cronbach's alpha reliability coefficient was determined for the classroom instruction set of questions in the first component and for each summated scale relating to multiple intelligences in the second part of the survey. The survey question numbers and the Cronbach's alpha index for each area are indicated in the following chart:

Cronbach's alpha coefficient indexes range from zero to one. The higher the score, the more reliable the questions are considered. An Alpha index of ≥ 0.7 is generally considered acceptable. The Cronbach's alpha of the classroom instruction questions surpassed this with an index of .916. Most of the multiple intelligence areas had reliability indexes which exceeded this level, also. However, at .681, the Cronbach's alpha for the set of Spatial-Temporal questions was slightly less than the expected level of 0.7. Overall, the Cronbach's alpha indexes indicate acceptable reliability and consistency.

Although the study was primarily quantitative, the data were enriched through an open-ended qualitative question at the conclusion of the survey. Additional information regarding specific ways teachers utilize music in their classrooms was collected through this survey question. This question allowed the participants to freely describe how they used music in the classroom and their perceptions regarding the impact of instruction through music. Also, it allowed the researcher to seek and draw generalizations from language patterns and usage among the responses.

Table 3

Survey Summative Scales

Category of Questions	Survey Question Numbers	Cronbach's alpha
Classroom Instruction	12, 13, 14, 15, 16, 17, 18, 19, 20, 21	.916
Naturalist Intelligence	22, 28, 33, 40, 52, 58, 73, 81, 90	.887
Musical Intelligence	27, 32, 36, 39, 44, 62, 65, 80, 86	.770
Verbal-Linguistic Intelligence	30, 38, 45, 51, 66, 74, 84, 88	.750
Logical-mathematical Intelligence	23, 31, 47, 57, 61, 64, 78, 89, 91	.738
Interpersonal Intelligence	24, 35, 49, 54, 69, 72, 75, 79, 87	.727
Bodily-kinesthetic Intelligence	29, 37, 46, 48, 53, 59, 63, 77, 83	.720
Intrapersonal Intelligence	26, 34, 42, 50, 56, 67, 70, 76, 85, 92	.706
Spatial-temporal Intelligence	25, 41, 43, 55, 60, 68, 71, 82	.681

Procedures

The survey created by the researcher was reviewed by the expert committee. They completed a Validity Questionnaire (Appendix B) about the survey. Their comments and suggestions resulted in several changes in the instrument. The teachers of the pilot study completed the survey and made suggestions which led to the final revisions. The six page survey instrument was printed on white paper in an 8 ½ x 11 inch booklet form (Appendix A). The researcher sought permission from the Institutional Review Board (IRB) to use the survey instrument (See Appendix C). Additionally, consent was requested and granted from the school districts' superintendents. Their approval allowed the administration of the survey in the schools selected (See Appendix

D). Information was exchanged and cooperation sought from each school principal. In each school setting prior to the instrument administration, an overview of the survey and the study's purpose were provided to participants. Teachers were told that completion of the survey indicated their consent to participate in the study. Within a two week period in 2009, the survey was administered to 87 elementary teachers at four elementary schools in the southeastern United States. At the conclusion of the survey, the researcher requested that participants complete an open-ended question regarding classroom practices. Questionnaires were later numbered for ease of identification when compiling responses. All survey responses remained anonymous. Data collected were organized and analyzed.

Limitations

Threats to internal validity are inherent in correlational design studies. One threat in this study was the absence of randomly selected participants. Participants in this study were not randomly selected, but were asked to participate based on their current employment at local elementary schools. The schools were selected due to proximity of location to each other and to the researcher. Additional factors in the selection of these schools included the instructional grade levels of the schools and the similarity of the schools' instructional programs, including music instruction. Most study participants were female, since there are few male elementary teachers in the schools selected.

The order of occurrence between the variables was another threat of internal validity. In correlational studies, it is not always known which variable may have impacted other variables. For example, in this study one may have assumed that the teacher's relative level of musical intelligence impacted the frequency of instruction

through music and the perception of the value of music instruction. Though less likely, the reverse may have been true; the frequency of instruction through music may have increased the participant's level of musical intelligence.

Another limitation was the possibility of extraneous variables. In this study, one extraneous variable was the participants' educational background related to the use of music in classroom instruction. All study participants had college degrees and were designated by the state as certified teachers. Many of the educators had attended similar professional development provided by the district and/or the state. Yet, the teachers in this study represented a variety of college and university teacher preparation programs, undergraduate and graduate degrees, and professional development trainings. It was unrealistic to assume that each teacher achieved a similar level of understanding regarding integrated instruction, differentiated instruction, or teaching through music. Therefore, the participants' educational background specifically pertaining to the use of music in the classroom remained an extraneous variable.

Other extraneous variables were the correlations between and among the multiple intelligences of the survey participants. Each person possesses varying levels of each of the eight intelligences. The intelligences work in conjunction with one another to create a unique intelligence identity for each individual. However, a person skilled in musical performance may have scored highly in musical intelligence, but may have also scored well in other intelligences. This person may have a high musical intelligence, yet if it was not one's highest score, then it was not considered the dominant intelligence. Therefore, it was undetermined how closely related intelligences may affect the strength of the musical intelligence scores.

Data Analysis

The primary research question for this study was: What relationships exist among teachers' perceptions of self-evaluated musical intelligence, their perceived value of instruction through music, and the teachers' frequency of instruction through music in their classroom practices?

More specifically, the study addressed the following questions:

1. What are elementary teachers' perceptions of instruction through music? How do teachers perceive the value of instruction through music?
2. Do elementary teachers utilize music for instruction? If so, with what frequency do teachers use music during instruction?
3. Is there a relationship between the teachers' perceptions of the value of instruction through music and their self-reported frequency of instruction through music?
4. For study participants, in relation to the strength of other intelligences, how dominant is musical intelligence?
5. Is there a relationship between teachers' perceptions of the value of instruction through music and their self-evaluated level of musical intelligence?
6. Is there a relationship between teachers' self-reported frequency of instruction through music and their self-evaluated level of musical intelligence?

Using Likert scales, responses were used to determine a numerical value for each teacher's perceptions, frequency, and customary methods of instruction through music. The second portion of the instrument provided a measure of teachers' multiple intelligences. From this portion of the instrument, responses on Likert scales were used to determine an overall mean value for each of the eight multiple intelligences. Using

individual participant's numerical responses for each multiple intelligence summative scale, the dominant multiple intelligence was determined for each participant. This provided the frequency and percent of occurrence for each dominant multiple intelligence within the study population. Scores for perceptions, frequency of instruction, and levels of musical intelligence were compared and analyzed.

The primary variables of this correlational study were elementary teachers' perceptions of the value of instruction through music, their self-reported frequency of instruction through music, and their self-evaluated level of musical intelligence. Using scores from the instrument, bivariate analyses using Pearson's product moment correlation were used to determine if a correlation existed between any two of the primary variables.

In addition to the classroom instruction questions in the initial portion of the survey, the researcher gained further insight into how these teachers utilized music and integrated instruction through music through the qualitative responses at the end of the survey. Generalizations were drawn based on the information collected from these responses.

CHAPTER IV

RESULTS

The purpose of this chapter is to present the results from the quantitative analysis of the data collected. This correlational study examined and analyzed relationships between pairs of the following variables: elementary teachers' perceptions of the value of instruction through music, their self-reported frequency of instruction through music, and their self-evaluated level of musical intelligence. The data collection for the study was completed in 2009 over a period of approximately two weeks. Eighty-seven teachers from four elementary schools in the southeastern part of the United States voluntarily participated in the study.

Descriptive Data

Frequency distributions were completed on the collected data. No coding errors were detected. The initial portion of the survey instrument incorporated questions of general information. Included were questions to collect data about length of teaching experience, music education course experiences, and subjects or grades taught.

As shown on Table 4, a third (33.3%, n = 29) of the teachers surveyed taught in grades Kindergarten or first. The next largest group of teachers taught second and third grades, denoting 28.7 % (n = 25) of the participants. Teachers who taught in multiple grades were represented in the Kindergarten through fifth grade category (19.5%, n = 17). The number of teachers in this group and the fourth and fifth grade group (18.4%, n = 16) were almost the same.

Table 4

Participants' Grade(s) Currently Taught

N=87

Grades	Frequency	Percentage
Kindergarten – 1st grades	29	33.3
2nd – 3rd grades	25	28.7
4th – 5th grades	16	18.4
Kindergarten – 5th grades	17	19.5

The frequencies and percentages for responses regarding length of teaching experience are shown in Table 5. As indicated in the table, 31% (n = 27) of surveyed teachers had between six and ten years of teaching experience. Those with minimal experience (23%, n = 20) and teachers with more than twenty years of experience (21.8%, n = 19) were almost equal in number.

Of the 87 participants, 69 (79.3%) were teaching in self-contained classes and 18 (20.6%) were not. None of the teachers had earned a specialist or doctorate degree. At 58.7% (n = 51), the majority of the teachers had a bachelors degree, while 41.4% (n = 36) had a masters degree.

Table 5

Participants' Length of Teaching Experience

N=87

Years of teaching	Frequency	Percentage
0 - 5	20	23.0
6 - 10	27	31.0
11 - 15	11	12.6
16 - 20	10	11.5
More than 20	19	21.8

In optimal brain development for musical learning, the 'critical periods' probably occur before the end of the first decade of life (Begley, 1996; Gordon, 2003). The development of the brain's corpus callosum, necessary for cross-hemispheric connections, is even greater among those who began an active study of music prior to the age of seven (Hodges, 2006). Final musical neurological pruning probably occurs between the ages of approximately nine and 12 years old (Langstaff & Mayer, 1996). Based on this research, study participants were asked about their previous musical training. Teachers indicated their levels of early music training on a Likert scale, with five as the earliest musical training (*learned to read music before the age of seven*) and one representing no early musical training (*none prior to 18 years of age*). Table 6 indicates the frequencies and percentages of their responses

Table 6

Participants' Early Musical Training

N=85

Indicators	Frequency	Percentage
None prior to 18 years of age	33	38.8
Singing experiences; did not learn to read music	8	9.4
Instrument or voice lessons; learned to read music after age 12	4	4.7
Instrument or voice lessons; learned to read music between ages 7-12	37	43.5
Instrument or voice lessons; learned to read music prior to age 7	3	3.5

As indicated in Table 6, only three participants (3.5%) learned to read music prior to the age of seven. However, a majority (43.5%, n = 37) of the teachers had voice or instrument lessons and learned to read music between the ages of seven and twelve. Therefore, almost 47% (n = 40) of the teachers surveyed received musical training at a significant age. This early musical training may have allowed their brains to evade the "pruning" of musical neural circuits (Sousa, 1995). Conversely, 38.8% of the respondents (n = 33) had no musical training prior to the age of 18.

Many colleges of education require a music education course as part of their teacher preparation program. Participants were asked about their music coursework and how it prepared them to teach or integrate music as part of their classroom curriculum. Only seven (8.0%) of the 87 respondents experienced a music education course which did a good (6.9%, n = 6) or excellent (1.1%, n = 1) job of preparing them to teach music.

Eighteen teachers (20.7%) stated that their music course barely addressed teaching music. Moreover, the majority of respondents (43.7%, n = 38) indicated that their course did not prepare them to teach music. More than one-fourth of the teachers surveyed (27.6%, n = 24) did not take a music education class as part of their college coursework. Table 7 illustrates the collected responses:

Table 7

Participants' Music Education Course Perceptions

N=87

Indicators	Frequency	Percentage
Did not take a music education course.	24	27.6
Music education course did not prepare me to teach music.	38	43.7
Music education course barely addressed teaching music.	18	20.7
Music education course did a good job of preparing me to teach music.	6	6.9
Music education course did an excellent job of preparing me to teach music.	1	1.1

Since people who doubt their abilities related to a task are more likely to shy away from that particular task (Bandura, 1986), survey participants were asked to choose their least favorite and most favorite subjects to teach or integrate into the curriculum. Table 8 shows the survey responses. The frequency of responses for least favorite subject is shown in ascending order and those for most favorite subject are depicted in descending order.

Table 8

Least and Most Favorite Subjects to Teach or Integrate

N=87

Least Favorite	Frequency	Percentage	Most Favorite	Frequency	Percentage
Reading	5	5.7	Reading	29	33.3
Art	7	8.0	Math	18	20.7
English	7	8.0	Art	10	11.5
Math	8	9.2	Science	10	11.5
Music	9	10.3	English	7	8.0
Spelling	9	10.3	Social Studies	3	3.4
Science	12	13.8	Music	1	1.1
Social Studies	12	13.8	Spelling	0	0.0
Physical Education	13	14.9	Physical Education	0	0.0

Based on Bandura's research and the survey responses, teachers in this study may devote more time to Reading than other subjects. Reading had the highest number of responses for favorite subject (33.3%, n = 29) and the lowest number for least favorite subject (5.7%, n = 5). In contrast, these educators probably avoided integrating Physical Education. Physical Education received the highest number of responses for least favorite subject (14.9%, n = 13). Neither Physical Education (0.0%, n = 0) or Spelling (0.0%, n = 0) was selected as a favorite subject to teach or integrate into the curriculum. Eight participants (10.3%, N = 87) selected music as least favorite subject and only one (1.1%, N = 87) chose music as his or her favorite subject. These responses may be indicative of teachers avoiding instruction through music because of low musical self-efficacy.

One of the primary variables of the study was teachers' perception of the value of music as an integral part of classroom instruction. Teachers were asked to indicate their perception of the value of music using a Likert scale of one to five, with one representing *No importance* and five indicating *Extreme importance*. Table 9 shows the frequency and percentages of responses for this question.

Table 9

Teachers' Perceptions of the Value of Music as Part of Instruction

N=87

Perceptions	Frequency	Percentage
No importance	0	0.0
Little Importance	6	6.9
Moderate Importance	33	37.9
Significant Importance	24	27.6
Extreme Importance	24	27.6

Over half (55.2%, n = 48) of the teachers surveyed indicated that music as part of instruction was either extremely (27.6%, n = 24) or significantly (27.6%, n = 24) important. More than a third (37.9%, n = 33) of the teachers identified the value of music as moderately important. Less than seven percent (n = 6) of the participants believed music to be of little or no importance. As noted in Table 10, the mean of the responses related to the value of music as part of instruction was 3.76 on a Likert scale of one to five. On this scale a five denoted a high level of value and a one represented no value. This relatively high mean further confirmed the participants' belief in the value of music.

Table 10

Means of Value and Frequency of Instruction Through Music

N=87

Survey Questions	Means*
Teachers' perception of music's value as an integral part of instruction	3.76
Music instructional time as compared to other subjects	2.21
Music instructional time in minutes per week	2.28

*Means based on a Likert scale of 1 to 5; 1 = Low; 5 = High

Another variable of the study was teachers' self-reported frequency of instruction related to music. Two questions using Likert scales of one to five were used to collect this information. On each Likert scale, a response of one indicated that no time was spent on music-related instruction. The first frequency question on the survey asked participants to evaluate their level of music-related instruction as compared to other subjects. On this question, a five represented *More than other subjects*. As shown in Table 10, the overall mean for the responses to this question was 2.21. The second survey frequency question asked how many minutes each week were utilized for instruction related to music. A five on the Likert scale for this question indicated that the teacher spent *About an hour or more* each week on music-related instruction. This question's responses had a similar mean of 2.28. Table 11 shows the frequency and percentages of the participants' responses:

Table 11

Frequency of Instruction Through Music

N=87

Relative Time Spent on Music-related Instruction		
Responses	Frequency	Percentage
None	12	13.8
Very little	51	58.6
Less than other subjects	19	21.8
Same as other subjects	4	4.6
More than other subjects	1	1.1

Minutes per Week Spent on Music-related Instruction		
Responses	Frequency	Percentage
None	18	20.7
Less than 15	41	47.1
Between 15 - 30	18	20.6
Between 30 – 45	6	6.9
About an hour or more	4	4.6

Collectively, as seen on Table 9, over 93% (n = 81) of the responses indicated that music was moderately to extremely important. Yet, the data on Table 11 show that the majority of participants responded that music-related instruction occurred very little

(58.6%, n =51) or less than 15 minutes (47.1%, n = 41) each week. Only five teachers (5.7%, N = 87) used music-related instruction the same (4.6%, n = 4) or more (1.1%, n = 1) than other subjects. Ten teachers (11.5%) out of 87 denoted their use of music as 30 minutes or more each day. Based on Bandura's research, these findings parallel those related to favorite and least favorite subject. Teachers may have spent less time on music instruction because it ranks low in the spectrum of favorite subjects.

Research Questions and Hypothesis

The primary research question for this correlational study was: What relationships exist among teachers' perceptions of self-evaluated musical intelligence, their perceived value of instruction through music, and the teachers' frequency of instruction through music in their classroom practices? The hypothesis stated that a positive correlation would exist among the three main variables. Based on the broad query of the main research question, more specific research questions were developed.

1. What are elementary teachers' perceptions of instruction through music? How do teachers perceive the value of instruction through music?
2. Do elementary teachers utilize instruction through music? If so, with what frequency do teachers use music during instruction?

As shown in Table 9, based on the mean of 3.76 (based on a Liert scale of one to five, five = high), teachers in the survey valued the use of music as a moderately to significantly important part of instruction. Additionally, a Pearson's Product Moment Correlation (Pearson's correlation) was used to determine if a relationship existed between teachers' perception of the value of music as an integral part of instruction and their length of teaching experience. The Pearson's correlation indicated a low, positive

correlation between perceptions of the value of music and years of teaching experience. This correlation was significant ($r = .246$, $p = .022$). Increased years of experience correlated to perceptions of increased value of music in instruction. In other words, an educator with greater teaching experience was more likely to positively perceive the value of music as part of classroom instruction. Conversely, there existed a greater possibility that teachers with minimal experience viewed the value of music as less positive.

However, responses related to the frequency of the use of music during instruction had means which were much lower, 2.21 and 2.28. Based on a Likert scale of one to five (five = high), these low means indicated that teachers spent very little time on music-related instruction compared to other subjects. Average time spent on music-related instruction was less than 15 minutes per week. Therefore, the teachers may have valued the use of music, yet little time was given to music in the course of their teaching.

To determine how teachers use music and music-related instruction, 10 questions in the initial component of the survey addressed classroom practices related to music. Each indicator used a Likert scale of one to five. On the scale, a one represented *Statement does not describe me at all* and a five indicated *Statement describes me exactly*. Table 12 shows the means for each of the questions concerning classroom practices related to music.

Table 12

Classroom Instruction Related to Music Means

N=87

Indicators	Means*
I regularly use songs and /or chants to teach or reinforce information.	3.14
I am knowledgeable about the benefits of using music as a part of classroom instruction.	2.94
I am very comfortable integrating music, songs, and rhythmic activities into my instruction.	2.87
I regularly use music in class to set the tone.	2.64
Students in my class are encouraged to create songs about information in subjects other than music.	2.24
I am very comfortable integrating musical concepts and terminology into my instruction.	2.19
I regularly use music strategies during instruction in subjects other than music.	2.14
I regularly use music as a means of providing differentiated instruction for my students.	2.02
Students in my class have regular opportunities to create music or rhythms.	1.92
I regularly teach concepts in music for transfer to other subjects.	1.82

*Means based on a Likert scale of 1 to 5
1 = *Statement does not describe me at all*; 5 = *Statement describes me exactly*

As shown in Table 12, a mean of 2.94 conveys that teachers are reasonably knowledgeable about the benefits of using music as part of classroom instruction. The highest mean of 3.14 revealed a moderate use of songs and/or chants in teachers' classes.

The third highest mean was related to a question about teachers' comfort in integrating music, songs, and rhythmic activities. Based on the mean of 2.87, teachers were fairly comfortable with this integration. However, based on the previously stated means representing frequency, the teachers seldom used music-related instruction.

The only other mean approaching the midpoint on the Likert scale was 2.64 which represents using music to set the tone in class. All other questions' responses resulted in means less than 2.25. Collectively, these low means provided evidence of the insubstantial occurrence of musical instruction. Many of the classroom indicators have means of approximately 2 or less, which translates to "very little." Educators in this study seldom related music instruction to other subjects, used it for differentiated instruction, taught any musical concepts, or allowed students to create their own songs, chants, or rhythms. The highest means among the classroom instruction questions indicated the occasional use of music for setting the class tone, listening to music, singing songs, and using songs or chants to reinforce information. However, none of these received a mean greater than 3.14, which represents moderate usage.

Additional Pearson's correlations were used to analyze the relationship between grade levels taught and frequency of music usage as an integral part of instruction. Grade level categories on the survey were Kindergarten and first grades, second and third grades, fourth and fifth grades, and Kindergarten through fifth grades. Educators who taught multiple grades were included in this final category. The level or category was represented by a numerical value, one through four, respectively. Frequency measures showed relative frequency of music instruction compared to other subjects and instructional time in minutes. The analysis of relative frequency of music usage and grade

levels taught indicated a low, negative, correlation ($r = -.231, p = .031$). An analysis was also completed using the data from the question which identified number of minutes of instruction per week. Pearson's correlation also showed a low, negative correlation for this analysis ($r = -.247, p = .021$). Each of these correlations was significant. These negative correlations between frequency of music instruction and teachers' grade levels indicated that the higher grade level and the multiple grade level teachers used music less frequently than those teachers in lower grade levels.

3. Is there a relationship between the teachers' perceptions of the value of instruction through music and their self-reported frequency of instruction through music?

In order to determine if a relationship existed between teachers' perceptions of the value of instruction through music and their self-reported frequency of instruction through music, an analysis was completed using Pearson's correlation. A low, positive correlation existed between the teachers' perception of the value of instruction through music and the frequency of instruction through music based on the number of minutes per week instruction occurred ($r = .283, p = .008$). A moderate, positive correlation existed between the teachers' perception of the value of instruction through music and the frequency of instruction through music relative to other subjects ($r = .418, p < .001$). Therefore, the answer to the question is yes; there is a significant, positive correlation between teachers' perceptions of the value of instruction through music and their self-reported frequency of instruction through music. Teachers who value music are more likely to utilize music in their classroom instruction.

4. For participants, which of the multiple intelligences was dominant? In relation to the strength of other intelligences, how dominant is musical intelligence?

Table 13

Teachers' Multiple Intelligences

N=87

Intelligence	Frequency	Percentage
Intrapersonal Intelligence	25	28.7
Logical-mathematical Intelligence	11	12.6
Bodily-kinesthetic Intelligence	11	12.6
Natural Intelligence	11	12.6
Musical Intelligence	10	11.5
Interpersonal Intelligence	7	8.0
Verbal-linguistic	6	6.9
Spatial-temporal	6	6.9

Chan's research (2003) of high school educators found that most teachers scored high in people-related intelligences such as Intrapersonal. As shown in Table 13, this study parallels Chan's in that respect. Intrapersonal Intelligence was the dominant intelligence among the greatest number of study participants. The intelligence with the second highest frequency was tied, with Logical-mathematical (n = 11), Bodily-kinesthetic (n = 11), and Natural Intelligences (n = 11) each representing 12.6% of the study population. Musical Intelligence was the dominant intelligence for 11.5% (n = 10) of the participants. Interpersonal (8%, n = 7), Verbal-linguistic (6.9%, n = 6), and Spatial-temporal (6.9%, n = 6) represented the smallest frequencies.

Table 14

Multiple Intelligences: Means of Participants

N=87

Intelligence	Means*
Intrapersonal Intelligence	3.99
Bodily-kinesthetic Intelligence	3.62
Natural Intelligence	3.55
Interpersonal Intelligence	3.51
Logical-mathematical Intelligence	3.49
Spatial-temporal	3.49
Verbal-linguistic	3.43
Musical Intelligence	3.41

*Means based on a Likert scale of 1 to 5
1 = *Statement does not describe me at all*; 5 = *Statement describes me exactly*

The means shown in Table 14 represent averages of scores obtained from the summative scales for Multiple Intelligences. The summative scales were composed of Likert scales from 1 to 5. A one on the scale represented *Statement does not describe me at all* and a five indicated *Statement describes me exactly.* The fourth research question asked: In relation to the strength of other intelligences, how dominant is musical intelligence? Among this group of study participants, the existence of musical intelligence as a dominant intelligence was very limited. In relation to other intelligences, musical intelligence's mean of 3.41 was the lowest. Therefore, among the study participants, dominant Musical Intelligence occurred infrequently and, based on the

overall means, was the weakest relative intelligence among the eight Multiple Intelligences.

Further analysis was conducted to determine if early musical training had impacted the participants' self-evaluated musical intelligence. A Pearson's correlation between responses related to early musical training and the summative scale for Musical Intelligence showed a moderate, positive correlation between the two variables ($r = .303$, $p = .005$). Although this significant correlation does not establish causality, teachers with early musical training were more likely to have higher levels of self-evaluated musical intelligence as an adult. This finding is consistent with neurological research which suggests that without early musical experiences during "critical periods" of optimal brain development, the essential neural connections for music-related skills may be lost (Langstaff & Mayer, 1996, Begley, 1996; Gordon, 2003). Teachers who had early musical training may have evaded the "pruning" of those synaptic connections (Sousa, 1995). By avoiding "pruning", these teachers may have the advantage of established neurological musical circuitry.

5. Is there a relationship between teachers' perceptions of the value of instruction through music and their self-evaluated level of musical intelligence?

In order to determine if a relationship existed between teachers' perceptions of value of instruction through music and their level of musical intelligence, a Pearson's correlation was accomplished. The analysis was completed using collected data from the Musical Intelligence summative scale and the survey responses regarding the value of instruction through music. A moderate, positive correlation between the two variables was identified ($r = .350$, $p = .001$). Therefore, a significant relationship does exist

between teachers' perceptions of the value of music in instruction and their self-evaluated level of musical intelligence. One who has a higher musical intelligence is more likely to value the use of music during instruction. Conversely, one who values the use of music has a greater possibility of having a higher level of musical intelligence. The reverse is also true. Teachers who lack a significant level of musical intelligence will probably not value the use of music as part of instruction.

6. Is there a relationship between teachers' self-reported frequency of instruction through music and their self-evaluated level of musical intelligence?

A Pearson's correlation was used to analyze the data to determine if a relationship existed between teachers' frequency of instruction through music and their level of musical intelligence. Participants reported their instructional frequency through two questions. The first frequency question in the survey measured the amount of time spent on music instruction relative to other subjects. The Pearson's correlation revealed a low, positive correlation between relative time spent on music instruction and teachers' level of musical intelligence ($r = .254, p = .017$). The second survey question concerning frequency allowed each participant to select a response confirming how many minutes per week he or she used instruction through music. Using Pearson's correlation, a low, positive correlation was identified between the music instruction time in minutes and the teachers' self-evaluated musical intelligences ($r = .181, p = .093$).

Based on both of these positive, significant correlations, a relationship existed between teachers' self-reported frequency of instruction through music and their self-evaluated level of musical intelligence. Teachers with stronger levels of musical intelligence were more likely to devote time to the use of music during instruction. These

findings are consistent with Bandura's (1986) research which states that people who are confident in their abilities are more likely to engage in that particular task. Overall, the teachers' self-evaluated levels of musical intelligence showed that they did not highly value their musical skills and, therefore, were less likely to spend time on musical instruction.

At the end of the survey, participants were asked to provide examples of how they used music in their classrooms. This format provided a verbal platform from which teachers could elaborate on their use of music in the classroom. Each of the responses was categorized according to how music was utilized. Many responses had multiple examples. Therefore, a participant's response may have been placed in several categories. The overwhelming majority of the responses were related to teaching new information or skills, setting the tone in class with background music, and using songs to reinforce information. These responses are consistent with those from the initial components of the survey.

CHAPTER V

SUMMARY, DISCUSSION, AND CONCLUSIONS

Summary

The primary purpose of this study was to examine elementary educators' perceptions and practices of instruction through music. Within this study, the researcher sought to answer the question: What relationships exist among teachers' perceptions of self-evaluated musical intelligence, their perceived value of instruction through music, and the teachers' frequency of instruction through music in their classroom practices?

The hypothesis for this question was proved to be correct: a positive correlation did exist among the primary three variables.

More specific questions of the study were:

1. What are elementary teachers' perceptions of instruction through music? How do teachers perceive the value of instruction through music?
2. Do elementary teachers utilize instruction through music? If so, with what frequency do teachers use music during instruction?
3. Is there a relationship between the teachers' perceptions of the value of instruction through music and their self-reported frequency of instruction through music?
4. For study participants, which of the multiple intelligences is dominant? In relation to the strength of other intelligences, how dominant is musical intelligence?
5. Is there a relationship between teachers' perceptions of the value of instruction through music and their self-evaluated level of musical intelligence?
6. Is there a relationship between teachers' self-reported frequency of instruction through music and their self-evaluated level of musical intelligence?

Summary of Procedures

Within a two week period in 2009, the survey was administered to eighty-seven elementary teachers at four elementary schools. At the conclusion of the survey, participants were asked to complete an open-ended question regarding classroom practices. Although all survey responses were anonymous, questionnaires were later numbered for ease of identification when compiling and organizing responses. Data collected were analyzed.

Summary of Major Findings

1. Elementary teachers rated themselves as moderately knowledgeable of the benefits of using music as part of classroom instruction.
2. Elementary teachers' perceived music as an integral part of instruction as having moderate to significant value.
3. Teachers seldom used music during their classroom instruction. Although infrequent, when music was used it was primarily for singing, listening, to set the tone in class, and as songs and chants to reinforce information.
4. A moderate, positive correlation existed between teachers' perceptions of the value of instruction through music and their self-reported frequency of instruction through music.
5. A moderate, positive correlation was revealed between early musical training and self-evaluated musical intelligence.
6. A moderate, positive correlation was found between teachers' perceptions of the value of instruction through music and their self-evaluated level of musical intelligence.

7. A low, positive correlation existed between teachers' self-reported frequency of instruction through music and their self-evaluated level of musical intelligence.
8. A low, positive correlation was discovered between teachers' length of teaching experience and perceptions of the value of music as part of instruction.
9. A low, negative correlation existed between the educators' current instructional grade level taught and the frequency of music usage as part of instruction. The higher the grade level of teaching, the less frequently music was used as part of instruction.

Discussion

Elementary teachers indicated a moderate awareness (M = 2.94 on a Likert scale of one to five; five = high level) of the benefits of music as a part of instruction. Their perceptions of the value of music as an integral part of instruction were moderate to significant (M = 3.76 on a Likert scale of one to five; one = *No importance*; five = *Extreme importance*). Although they were armed with the knowledge of music's benefits and perceived the value of music-related instruction, teachers seldom utilized music as a part of their classroom teaching. The majority of participants (58.6%, n = 51) indicated that music-related instruction occurred V*ery little* in relation to other subjects. Another frequency question confirmed this lack of musical instruction. Most teachers (47.1%, n = 41) specified *Less than 15 minutes* each week as the amount of time spent on music-related instruction.

Teachers reported that music was most often used for listening, singing, to set the tone in class, and as songs and chants to reinforce information. However, music was seldom employed for differentiated instruction (M = 2.02 on a Likert scale of one to five;

five = regular use) or transfer to other subjects (M = 1.82 on a Likert scale of one to five; five = regular use). Students were rarely given the opportunity to create music, songs, or rhythms (M = 1.92 on a Likert scale of one to five; five = regular opportunities). It appears that teachers ignored what they knew to be a valuable part of instruction. This may be because teachers were not comfortable teaching or integrating music. With a mean of 2.87 on a Likert scale of one to five, teachers were relatively comfortable integrating music, songs, and rhythmic activities. However, teachers rated their comfort level for integrating musical concepts and terms with a mean of 2.19 on a Likert scale of one to five. Five represented *Very comfortable*. This mean indicates a low level of comfort for musical teaching beyond basic music, songs, and rhythmic activities.

Though music was rarely used, a moderate, positive correlation ($r = .418, p < .001$) was found between teachers' perceptions of the value of instruction through music and their self-reported frequency of instruction through music relative to other subjects. A low, positive correlation ($r = .283, p = .008$) existed between educator's perceived value of instruction through music and the frequency of instruction in minutes per week. Both correlations were significant. Based on these correlations, teachers' were more likely to use music as a part of instruction if they positively perceived the value of music. Conversely, the teachers who rated the value of music instruction as having *Little importance* would most likely devote a minimal amount or no time for its instruction. This finding supports research by Wood, Cobb, & Yackel (1990, as cited in Morgan, 2008) which described how educators' attitudes toward teaching may vary according to their beliefs and perceptions of the subject. If the teacher has a negative attitude toward music, such as believing that it has little or no value, then it is likely that the teacher will

spend little time on the subject.

An additional analysis was completed to determine if a correlation existed between early music training and self-evaluated musical intelligence. Participants' levels of early music training were self-identified on a Likert scale, with five as the earliest musical training (*Learned to read music before the age of 7*) and one as no early musical training (*None prior to 18 years of age*). A Pearson's correlation was completed using these scores and the scores from the musical intelligence summative scale. A moderate, positive correlation ($r = .303, p = .005$) was found between early musical training and self-evaluated musical intelligence. The participants who received musical training at an early age were more likely to have a higher level of self-evaluated musical intelligence as an adult. This correlation supports research on "pruning" (Sousa, 1995) and the "critical period" (Gordon, 2003) of optimal brain development.

Throughout childhood, appropriate musical experiences are required in order for the brain to establish musically inclined neural connections. Among some of the teachers (47.0%, n = 40), early musical training prior to the age of 12 may have diminished the possibility of "pruning" and increased the likelihood of the stronger neural connections (Weinberger, 2000; Raucsher, 1999; Sousa, 1995). Those who began an active study of music prior to the age of seven (3.5%, n = 3) may have experienced greater development of the brain's corpus callosum, which is necessary for cross-hemispheric connections (Hodges, 2006). These connections made through early musical experiences may have provided a synaptic foundation for a greater level of musical intelligence. On the other hand, the 52.9% of the participants (n = 45) did not receive any musical training before the age of 12 and were more likely to have a low, self-evaluated level of musical

intelligence. Since they received no early musical training during the "critical period" of optimal brain development, "pruning" may have diminished their future musical potential (Gordon, 2003; Langstaff and Mayer, 1996; Sousa, 1995). "Pruning", resulting from limited musical experiences as a child, could have lessened the possibility of those teachers developing a strong musical intelligence.

Based on their self-evaluations, only 10 participating teachers (11.5%, N = 87) were dominant in musical intelligence compared to the other seven intelligences. According to this data, the study participants did not perceive their musical intelligence as strong. The mean for participants' overall musical intelligence (M = 3.41 based on a Likert scale of one to five; five = high) was the lowest among all the intelligence means. This collective lack of musical intelligence confirmed that participating teachers did not highly value their musical skills, and therefore, were less likely to spend time on musical instruction. Most teachers in the study (58.6%, n = 51) said they used music *Very little* compared to other subjects. Many of the participants (47.1%, n = 41) indicated that their frequency of music-related instruction was *Less than 15 minutes* each week. This finding confirms Bandura's (1986) research which states that people who have doubts about their skills and aptitudes are less likely to employ those tasks. A teacher's self-perceived strengths or weaknesses of intelligences may affect the teacher's efficacy related to his or her instructional ability and capacity to promote student learning in those intelligence areas (Chan, 2003). Teachers who feel lacking in their own intelligences may limit themselves to their areas of comfort and avoid new areas or strategies of teaching (Chan, 2003). Also, educators devote more teaching time to areas in which their sense of self-efficacy is higher (Riggs & Enoch, 1990). In further support of this research, only one

(1.1%, N = 87) educator valued music as a favorite subject and it was rated as least favorite subject by nine (10.3%, N = 87) participants.

Teachers had nominal scores in their self-reported frequency of instruction through music as measured in minutes per week and time relative to other subjects. Although their self-evaluated levels of musical intelligence were also minimal, low, positive correlations existed between these variables ($r = .254, p = .017$; $r = .181, p = .093$). Teachers with higher self-evaluated levels of musical intelligence were more likely to have increased frequency of instruction through music. On the other hand, a teacher who spent little time using instruction through music would be more likely to have a lower self-evaluated musical intelligence score. Again, this reinforces the research of Chan, and Riggs and Enoch. Teachers with limited levels of musical efficacy are less likely to positively evaluate their Musical Intelligence and may ignore instruction through music (Chan, 2003). Teachers who feel confident in an area of intelligence are more likely to devote instructional time to that area (Riggs & Enoch, 1990).

Teachers' perceptions of music's value as an integral part of instruction were moderate to significant (M = 3.75 on a Likert scale of one to five; five = high). Teachers' self-evaluated levels of musical intelligence were not strong and, comparatively, had the lowest mean score (M = 3.41 based on a Likert scale of one to five; five = high). However, the data analysis found a moderate, positive correlation ($r = .350, p = .001$) between teachers' perceptions of the value of instruction through music and their self-evaluated level of musical intelligence. Based on the Pearson's correlation, teachers with higher levels of self-evaluated musical intelligence had a greater likelihood of positively perceiving the value of instruction through music. The reverse is also true. Teachers with

positive perceptions of the value of instruction through music were more likely to have a greater musical intelligence.

Using Pearson's correlation, an additional analysis was completed to determine if a relationship existed between teachers' Musical Intelligence and Spatial-temporal Intelligence. A moderate, positive correlation was found ($r = .443, p < .001$). Those teachers who scored high in Musical Intelligence were more likely to score high in Visual-spatial Intelligence. The finding provides support to research by Hassler (Weinberger, 2000). Students aged nine to 24 years who scored high on musical ability also scored high on spatial visualization (Weinberger, 2000). Hassler's study showed correlational, not causal results.

Only seven (8.0%, N = 87) of the teachers in the survey had a good or excellent music education course in preparation to teach music. Some teachers felt that their music course barely addressed teaching music (20.7%, n = 18) or did not prepare them to teach music (43.7%, n = 38). Additionally, 24 (27.6%, N = 87) of the teachers did not take a music education course as part of their college course of study. This lack of positive musical instruction may have contributed to the overall low levels of self-efficacy related to music among participating teachers. Depressed levels of musical efficacy may have fueled feelings of discomfort when attempting to teach music.

A supplemental analysis was completed to determine if there was a relationship between teachers' years of experience and educators' perceptions of the value of music as part of instruction. The Pearson's correlation indicated that a low, positive correlation ($r = .246, p = .022$) existed between the two variables. The greater the number of years a teacher had taught, the greater the likelihood that the teacher would positively value the

use of music as part of instruction. It is also probable that as a teacher's years of experience increase so will his or her perception of the value of music as part of instruction. On the other hand, teachers with minimal experience were more likely to perceive music less positively.

Another supplemental analysis was used to discover a relationship between educators' instructional levels of teaching and their frequency of music usage as part of that instruction. Grade level categories on the survey were Kindergarten and first grades, second and third grades, fourth and fifth grades, and Kindergarten through fifth grades. Educators who taught multiple grades were included in this final category. As previously explained, frequency questions with Likert scales were used to measure the relative use of music as compared to other subjects and the frequency of music in minutes per week. These responses were analyzed using Pearson's correlations. A low negative correlation ($r = -.231, p = .031$) existed between the educators' current instructional grade level taught and the relative frequency of music-related instruction as compared to other subjects. An analysis was also completed using the data from the question which identified number of minutes of instruction per week. Pearson's correlation also showed a low, negative correlation for this analysis ($r = -.247, p = .021$). Each of these correlations was significant. In negative correlations, as the value of one variable increases, the value of the other variable decreases, therefore, the higher the instructional grade level of the teacher, the less frequently music was used as part of instruction. Upper elementary and teachers of multiple grades used music less frequently than other teachers. From this correlation, it may be deduced that teachers at the lower elementary level are more likely to utilize music in their classrooms than those in higher grades and those teachers of

multiple grades.

The results showed that teachers seldom used music for differentiated instruction (M = 2.02 on a Likert scale of one to five; five = regular use). The mean for Musical Intelligence was the lowest mean overall (M = 3.41 on a Likert scale of one to five; five = high). This low mean indicates that, as a group, the teachers did not perceive their Muisical Intelligence as a relatively strong intelligence. A teacher's self perception of strengths or weaknesses in areas of various intelligences may affect the teacher's efficacy or confidence in his or her ability to promote student learning in those areas (Chan, 2003). Therefore, it is logical to assume that other disciplines or intelligences are being impacted within teachers' classrooms. Specifically, Logical-mathematical, Spatial-temporal, and Verbal-linguistic all had means less than 3.5 on the Likert scale of one to five (five = high). Based on the results of Chan's research, differentiated instruction may occur less often through these intelligences since teachers are not strong in these intelligences.

Recommendations for Further Study

Additional research would be beneficial to determine teachers' perceptions of their needs related to instruction through music. This would assist in determining how to help teachers more effectively utilize music as a part of instruction in the regular classroom. This research is necessary in order to determine more specifically why teachers are not utilizing music as part of instruction. If the lack of music instruction is due to a lack of self-efficacy, then training or professional development in this area would be beneficial. Teachers would also benefit from observing another teacher model the use of music as an integrated part of lessons in other subjects. Other possible reasons

for the deficit in musical instruction may be lack of time during the course of the school day, lack of materials, and district and state emphasis on other tested subjects.

This study's survey results indicated that teachers valued instruction through music as moderately to significantly important. They also considered themselves to be moderately aware of the benefits of music. However, these teachers were not consistently teaching and integrating this valued subject in their classroom instruction. Further research could ascertain if similar incongruencies exist between other disciplines and teachers' perceptions of those disciplines. For example, study participants rated Reading as their overall favorite subject, yet as a group these same teachers scored quite low in Verbal-linguistic Intelligence. A closer examination of this inconsistency and others would help determine why these discrepancies exist.

Music has been shown to be a predictor of positive behavior (Gardiner, 2000). Assuming that a high level of Musical Intelligence indicates greater exposure to music, one may infer that teachers with high levels of Musical Intelligence may have a more positive outlook based on their musical experiences. Further research is needed to determine if this correlation is true. Additionally, research would also be appropriate to determine how students with behavioral difficulties respond to music.

Much of the available research correlating music and cognitive growth or student achievement is dated. Current research is needed in this field. Longitudinal studies to compare groups of students receiving different types or levels of musical instruction would help meet this need. For example, the academic performance of students whose teacher possesses a high level of Musical Intelligence or musical self-efficacy could be compared to students whose teacher is limited in those areas. Studies of this nature may

more definitively determine how music is best utilized and which musical strategies are paramount for academic and social growth. They may also provide further basis for teacher training in music.

Differentiated instruction is based on the premise that a teacher's instructional approaches should vary in order to best meet the needs of each individual student (Tomlinson, 1995). A comparative study of teaching methods for differentiated instruction could allow one group of teachers to use music in conjunction with other means to address differentiated instruction, while another group of teachers used other methods, without music. This type of study may provide additional knowledge of successful differentiated instructional methods.

Furthermore, it would be interesting to conduct this research in a different setting or with a larger population in order to confirm or refute findings. Similar studies of teachers' multiple intelligences have not been accomplished at the elementary level. Therefore, replication of this study in other locations or settings would be beneficial. Additionally, the voluntary completion of the survey for this study was mostly by self-contained classroom teachers. It would provide another perspective if a study determined how music is used by "special" teachers, such as librarians, Art, Physical Education, or Special Education teachers.

Research has shown that music may be used as a tool and an entry point for learning. The use of instruction through music may encompass differentiated instruction, multiple intelligences, improved memory, transfer of learning to other subjects, cognitive skills, and positive attitudes. In the book *Classroom Instruction That Works*, Marzano and associates have published nine recommended instructional strategies. Through

synthesized research, these strategies have been confirmed to have positive effects on student learning and achievement (2001). As previously discussed in chapter two, many of these instructional strategies may be accomplished through music. However, with its numerous positive benefits, varied uses in classrooms, and inherent capacity to increase student learning and achievement, music should be considered a vital instructional strategy in its own right. Music has the potential to become the tenth instructional strategy on Marzano's list. Further studies are needed to validate this recommendation.

Recommendations

Numerous research studies have indicated that music provides multiple benefits to students. However, it would be naive to assume that the use of only the typical classroom fare of simple songs and passively listening to music would be sufficient to improve student cognition and learning. For example, playing background music during class may seem a potentially easy way to integrate music but may, in fact, become background noise with no discernible educational value. Certainly, simple songs and musical activities may provide a good beginning, a basic foundation of tone, rhythm, and music appreciation. However, the preponderance of evidence indicates that in order for music to consistently provide the greatest long-term cognitive benefits, music instruction must exist at a more sophisticated level. Of the studies showing a positive correlation between music and a cognitive function, improved academic understanding, or higher test scores, most of them utilized instruction in which students learned to play an instrument and/or read musical notation. These improved cognitive functions may be due to the cross-hemispheric connections made when reading and making music (Gibson, 2008).

Effectively implementing instruction through music in the regular classroom

setting is a feasible, but arduous process. Even for teachers with musical training, this could be quite a challenge due to time constraints, obligations to teach other "tested" subjects, and a lack of funding to purchase needed musical materials (Kane, 2005). Yet, if these needs were met, most regular education teachers would still lack the confidence to teach music. In fact, self-perceptions of musical ability were found to be the strongest influence of one's use of music instruction (Bartel & Cameron, 2002).

If music is to become a vital part of the curriculum and used to help students learn, then schools must change. Schools must explicitly demonstrate the value of music through emphasis on its inclusion in the regular classroom curriculum. Music must become an accepted part of school culture. If educators truly support differentiated instruction, then they must accept the likelihood that some students would perform best if music were used as an entry point (Gardner, 1983). Students with existing high levels of Musical Intelligence may choose to complete certain assignments, solve problems, and create products through the use of music (Gardner 1983). Therefore, in order to meet these students' needs, teachers must be able to provide musical structures in the regular classroom. Administrators must embrace the benefits of instruction through music and ensure teachers are providing that instruction to ensure those benefits.

Recommendations for Practice

This unique study was relevant to current curricular apprehensions concerning the lack of opportunities for elementary students to benefit from musical instruction. With budget reductions in many states, music is often the first educational program to be eliminated (Moran, 2004). If classroom teachers do not use music during instruction, students' educational experiences may be incomplete (Schmidt, 2007).

Existing research overwhelmingly supports the benefits of music instruction at an early age and the use of music as part of instruction in the elementary curriculum. This research has shown that Musical Intelligence may be impacted by early musical training. Schools, districts, and state departments of education need to reevaluate the role of music within the curriculum. Music is not only an art, but can serve as a valuable tool for learning. A greater emphasis of instruction through music in classrooms would result in a more balanced curriculum. Professional development related to music may improve the frequency, consistency, and complexity of music's use as a part of classroom instruction. Based on the results of this study, professional development may be especially important to new teachers, teachers of upper elementary, and teachers of multiple grades. In this study these populations were less likely than their peers to utilize music during instruction. Ultimately, an improvement of teachers' skills and knowledge may transfer into greater student achievement (Garet, et al., 2001).

Much has been written about applying Gardner's Multiple Intelligence Theory to classroom practice. Yet, most research has ignored the possibility that a teacher's instruction may be impacted due to his or her own intelligences. Professional development related to the use of Multiple Intelligences would be beneficial to many educators. Since teachers own intelligences' strengths and weaknesses impact their teaching practice (Chan, 2003), then other intelligences in addition to music may be lacking in classroom practice. Based on this study's population, Spatial-temporal Intelligence, Verbal-linguistic Intelligence, and Interpersonal Intelligence are not strongly represented among teachers. According to Chan's research, these areas may be less evident in these teachers' instructional practices. Since students are most successful at

learning ideas and processes when experienced through a variety of intelligences (Gardner, 1983), it is imperative that teachers improve their own intelligences in order to better meet students' needs. Training in areas of need may help teachers feel more competent in additional intelligences. This intelligence growth could result in greater differentiated, cross-curricular, and balanced instruction.

School and district administrators need to consider teachers' strengths and weaknesses when planning professional development. Teachers can improve their intelligences through training (Gardner, 1993). However, generic professional development for all faculty members may only meet the needs or be beneficial to a small number and may prove to be discouraging for others. A needs-assessment related to teachers' multiple intelligences could provide valuable information concerning areas of strengths and weaknesses. These strengths and weaknesses could provide a baseline for further training, but may also provide insight into areas in which teachers would be best suited for teaching.

Few teachers in the study felt that their music education course provided adequate preparation for teaching or integrating music into regular classroom instruction. Institutions of higher learning need to re-examine their music education curriculum, methodologies, and coursework. Teachers need knowledge of how to successfully teach and integrate music and musical concepts into the general education curriculum. Based on the perceptions expressed through the survey, this knowledge is not consistently being taught. This lack of effective training leaves educators lacking in important skills.

Conclusions

The purpose of this study was to examine elementary educators' perceptions and practices of instruction through music. The initial research question was: What relationships exist among teachers' perceptions of self-evaluated musical intelligence, their perceived value of instruction through music, and the teachers' frequency of instruction through music in their classroom practices? Numerous analyses were accomplished in order to answer this question. Each variable in this question evidenced a low or moderate, positive correlation with each of the other variables. Though negative correlations were noted in the study, they only existed in the supplemental analyses. Since no causality has been established, one may not assume that any one of the variables caused the other. However, based on the analyses, all the variables—perceived value of instruction through music, teachers' self-evaluated musical intelligences, and frequency of instruction through music—are correlated. Therefore, the initial hypothesis is correct.

This study substantiates previous research which indicated that instruction is affected, even determined, by teachers' personal and pedagogical theories or beliefs (Ross, Cornett, & McCutcheon, 1992). These instructional beliefs are portrayed, at least in part, by the educator's Multiple Intelligences and self-efficacy (Chan, 2003). Findings of this study corroborate Chan's research: teachers' instructional practices *are* impacted by their perceived intelligence strengths and weaknesses. In this study, teachers' beliefs of their intelligences were positively related to the frequency and perceived value of instruction. Therefore, teachers' perceptions of their intelligences and their perceptions of the value of instruction through music were related to and may have impacted their classroom instruction.

LIST OF APPENDIXES

APPENDIX A

Relationships Among Teachers' Self-Perceptions of Musical Intelligence, Perceived Value of Instruction through Music, and Classroom Instructional Practices

GENERAL INFORMATION

Instructions: Select the best answer for each question by circling the answer or corresponding number.

1. What is your primary teaching assignment?

   K-1 2-3 4-5 K-5

2. How many years have you been teaching?

   0-5 6-10 11-15 16-20 more than 20

3. Do you teach in a self-contained class?

   1 Yes 2 No

4. What is the highest level of formal education which you have completed?

   1 Bachelor's Degree 2 Master's Degree
   3 Educational Specialist 4 Doctorate

5. Did you receive any music training before 18 years of age?

   1 None prior to 18 years of age
   2 singing experiences; did not learn to read music
   3 instrument or voice lessons; learned to read music after age 12
   4 instrument or voice lessons; learned to read music between ages 7-12
   5 instrument or voice lessons; learned to read music prior to the age of 7

6 In your degree coursework, how well did your music education course prepare you to teach music?

   1 I did not take a music education course.
   2 My music education course did not prepare me to teach music.
   3 My music education course barely addressed teaching music.
   4 My music education course did a good job preparing me to teach music.
   5 My music education course did an excellent job preparing me to teach music.

7 During instruction, what is your **least** favorite subject to teach or integrate into the curriculum?

   Reading Math English Social Studies Art

   Music Science Spelling Physical Education

8. During classroom instruction, which subject is your **favorite** subject to teach or integrate into the curriculum?

Reading	Math	English	Social Studies	Art
Music	Science	Spelling	Physical Education	

9. What is your perception of the value of music as an integral part of instruction?

No importance	Little importance	Moderately important	Significant importance	Extreme importance
1	2	3	4	5

10. How much time do you spend on instruction related to music?

None	Very little	Less than other subjects	About the same as other subjects	More than other subjects
1	2	3	4	5

11. What is your perception of the value of music as an integral part of instruction?

1 No importance
2 Minimally important
3 Moderately important
4 Significantly important
5 Extremely important

CLASSROOM INSTRUCTION

Instructions: Read each statement carefully. Choose the number that indicates how well each statement describes you.

1 = Statement does not describe me at all
2 = Statement describes me very little
3 = Statement describes me moderately well
4 = Statement describes me well
5 = Statement describes me exactly

12. 1 2 3 4 5 I regularly use music in class to set the tone.

13. 1 2 3 4 5 I regularly teach concepts in music for transfer to other subjects.

14. 1 2 3 4 5 Students in my class have regular opportunities to create music or rhythms.

15. 1 2 3 4 5 I regularly use music as a means of providing differentiated instruction for my students.

16. 1 2 3 4 5 I am very comfortable integrating musical concepts and terminology into my instruction.

17. 1 2 3 4 5 I am knowledgeable about the benefits of using music as part of classroom instruction.

18. 1 2 3 4 5 I regularly use songs and/or chants to teach or reinforce information.

19. 1 2 3 4 5 Students in my class are encouraged to create songs about information in subjects other than music.

20. 1 2 3 4 5 I regularly use music strategies during instruction in subjects other than music.

21. 1 2 3 4 5 I am very comfortable integrating music, songs, and rhythmic activities into my instruction.

MULTIPLE INTELLIGENCES

Instructions: Read each statement carefully. Choose the number which indicates how well each statement describes you.

1 = Statement does not describe me at all
2 = Statement describes me very little
3 = Statement describes me moderately well
4 = Statement describes me well
5 = Statement describes me exactly

22. 1 2 3 4 5 I enjoy nature and being outdoors.

23. 1 2 3 4 5 I get easily frustrated with disorganization.

24. 1 2 3 4 5 I appreciate cooperative learning activities such as group study sessions.

25. 1 2 3 4 5 I can maneuver through my house at night without lights.

26. 1 2 3 4 5 I am strongly aware of my moral beliefs.

27. 1 2 3 4 5 I frequently listen to music.

28. 1 2 3 4 5 Ecology and recycling are important to me.

29. 1 2 3 4 5 Regular exercise is an important part of my schedule.

30. 1 2 3 4 5 I am interested in the origin of words.

31. 1 2 3 4 5 I prefer to keep things orderly and organized.

32. 1 2 3 4 5 I remember lyrics and melodies of songs from years past.

33. 1 2 3 4 5 I believe in preserving and protecting green spaces, parks, and forests.

34. 1 2 3 4 5 I am very interested in social issues.

35. 1 2 3 4 5 I learn best when I can interact with others.

36. 1 2 3 4 5 I dislike listening to someone sing off-key.

37. 1 2 3 4 5 Being physically fit is important to me.

38. 1 2 3 4 5 I can hear words in my head before I read, speak, or write them.

39. 1 2 3 4 5 I enjoy musicals as much or more than other plays.

40. 1 2 3 4 5 I believe in preserving animals and plants which may be endangered.

41. 1 2 3 4 5 I have a good sense of direction and seldom get lost.

42. 1 2 3 4 5 I prefer to work independently.

43. 1 2 3 4 5 I recall things and can envision new ideas in mental pictures.

44. 1 2 3 4 5 I have always been interested in playing a musical instrument.

45. 1 2 3 4 5 I use mnemonic devises as a memory tool.

46. 1 2 3 4 5 I learn best by doing.

47. 1 2 3 4 5 I am good at using 'mental math' to make calculations in my head.

48. 1 2 3 4 5 I enjoy participating in active games and sports.

49. 1 2 3 4 5 I frequently socialize with my friends whether in person, online, or on the phone.

50. 1 2 3 4 5 I must understand the reason I should do something before I agree to do it.

51. 1 2 3 4 5 I am good at analogies.

52. 1 2 3 4 5 I enjoy learning about plants, animals, and ecological issues.

53. 1 2 3 4 5 I am good at using tools.

54. 1 2 3 4 5 I enjoy participating in team sports.

55. 1 2 3 4 5 I prefer to use a map rather than rely on verbal or written directions.

56. 1 2 3 4 5 I learn best when I have an emotional attachment to the subject.

57. 1 2 3 4 5 I am conscientious about organizing files on my computer.

58. 1 2 3 4 5 I am knowledgeable about a variety of animals and plants.

59. 1 2 3 4 5 Sitting still for long periods of time is very difficult for me.

60. 1 2 3 4 5 I can usually judge the time without looking at a clock.

61. 1 2 3 4 5 I enjoy working on a computer spreadsheet, database, or other program.

62. 1 2 3 4 5 I enjoy creating rhythmic patterns using tones, sounds, motions.

63. 1 2 3 4 5 When speaking, my hands are often in motion.

64. 1 2 3 4 5 I enjoy using logic to solve problems.

65. 1 2 3 4 5 It is difficult for me to concentrate on other things when music is playing.

66. 1 2 3 4 5 I enjoy writing letters, emails, journal entries, etc.

67. 1 2 3 4 5 I am strongly aware of my emotions and how they impact my actions.

68. 1 2 3 4 5 I can comfortably imagine how an object would look from a different perspective, such as 'bird's eye view'.

69. 1 2 3 4 5 I usually dislike working alone.

70. 1 2 3 4 5 I have a realistic view of my strengths and weaknesses.

71. 1 2 3 4 5 I am good at reading maps, diagrams, or blueprints.

72. 1 2 3 4 5 When I have a problem, I'm more likely to seek out another person for help than attempt to work it out on my own.

73. 1 2 3 4 5 I enjoy working in and learning more about a garden.

74. 1 2 3 4 5 Taking notes helps me to remember and retain information.

75. 1 2 3 4 5 I enjoy visiting online chat rooms.

76. 1 2 3 4 5 My attitudes strongly effect how I learn.

77. 1 2 3 4 5 I enjoy working with my hands.

78. 1 2 3 4 5 I enjoy puzzles and games requiring logic, reasoning, and rationalizing such as Sudoku.

79. 1 2 3 4 5 I consider myself a people person.

80. 1 2 3 4 5 I enjoy singing alone or with others.

81. 1 2 3 4 5 I often classify items according to natural characteristics.

82. 1 2 3 4 5 I enjoy jigsaw puzzles, three dimensional puzzles, Tetris, or mazes.

83. 1 2 3 4 5 My best ideas come to me when I'm engaged in some kind of physical activity such as walking.

84. 1 2 3 4 5 I enjoy word play such as anagrams, puns, spoonerisms, and idioms.

85. 1 2 3 4 5 I need to plan before proceeding with a task or actions.

86. 1 2 3 4 5 I remember information by putting it in a rhythm, rhyme, chant, or to music.

87. 1 2 3 4 5 I consider myself a 'team player'.

88. 1 2 3 4 5 I enjoy word puzzles such as Scrabble or crossword puzzles.

89. 1 2 3 4 5 My mind searches for patterns, regularities, or logical sequences in things.

90. 1 2 3 4 5 I often see things in nature which inspire me.

91. 1 2 3 4 5 I enjoy creating graphs, charts, and tables to organize data.

92. 1 2 3 4 5 I learn from reflecting on my previous actions.

Please provide examples of how you use music in your classroom.

_____

_____

_____

_____

APPENDIX B

Relationships Among Teachers' Self-Perceptions of Musical Intelligence, Perceived Value of Instruction through Music, and Classroom Instructional Practices

Validity Questionnaire

Thank you for volunteering your time to assist me in the development of this survey. Your input is very important to the completion and use of the survey and to my overall dissertation. Your willingness to participate is greatly appreciated!

Please evaluate the included survey using the following questions:

1. Is the language of the survey appropriate for and easily understood by teachers?

   _____

   _____

2. Does the survey contain language which is ambiguous, biased, offensive, or inappropriate?

   _____

   _____

3. Do the survey questions and statements address specific and appropriate issues regarding the following?

   - general teacher information _____

     _____

   - use of music in classroom instruction _____

     _____

   - teacher attitudes toward music as a part of instruction _____

     _____

   - teachers' self-evaluated multiple intelligences _____

     _____

4. Are there any statements or questions which should be excluded from the survey?

   _____

   _____

5. Are there any other statements or questions which should be included that are ***not*** a part of the survey?

   _____

   _____

6. Please make any other comments or suggestions about the survey.

   _____

   _____

   Signature _____

APPENDIX C

THE UNIVERSITY OF SOUTHERN MISSISSIPPI

Institutional Review Board

118 College Drive #5147
Hattiesburg, MS 39406-0001
Tel: 601.266.6820
Fax: 601.266.5509
www.usm.edu/irb

HUMAN SUBJECTS PROTECTION REVIEW COMMITTEE
NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Human Subjects Protection Review Committee in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months. Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **29071302**
PROJECT TITLE: **Relationships Among Elementary Teachers' Self-Perceptions of Musical Intelligence, Perceived Value of Instruction Through Music, and Classroom Instructional Practices**
PROPOSED PROJECT DATES: **05/01/09 to 08/15/09**
PROJECT TYPE: **Dissertation or Thesis**
PRINCIPAL INVESTIGATORS: **Peggy J. McCullough**
COLLEGE/DIVISION: **College of Education & Psychology**
DEPARTMENT: **Educational Leadership & Research**
FUNDING AGENCY: **N/A**
HSPRC COMMITTEE ACTION: **Expedited Review Approval**
PERIOD OF APPROVAL: **07/21/09 to 09/20/10**

Lawrence A. Hosman
Lawrence A. Hosman, Ph.D.
HSPRC Chair

7-23-09
Date

APPENDIX D

PASS CHRISTIAN PUBLIC SCHOOLS • COMMITTED TO EXCELLENCE

April 22, 2009

Ms. Peggy McCullough
8707 Pine Ridge Blvd.
Diamondhead, MS 39525

RE: Request for Permission to Survey Teachers

Dear Ms. McCullough,

I am in receipt of your letter of April 13, 2009 outlining your doctoral research project concerning teacher perceptions and the sample of the proposed teacher survey which you included.

I understand that you have already sought and received permission from the building principals involved to conduct the survey.

I feel that it is important to advance the research in the field of education, and your study looks like it could yield some interesting data. You have permission to ask teachers to voluntarily participate in your research study.

Best wishes as you accomplish your goal of earning a doctoral degree in education.

Sue Matheson

Sue Matheson, Ed. D.
Superintendent

SUE MATHESON, ***Ed. D., Superintendent***
6457 KILN-DELISLE ROAD • PASS CHRISTIAN, MISSISSIPPI 39571
PHONE (228) 255-6200 • FAX (228) 255-6204

APPENDIX E

April 28, 2009

Peggy McCullough
8707 Pine Ridge Boulevard
Diamondhead, Mississippi 39525

Dear Ms. McCullough:

The Bay St. Louis – Waveland School District will participate in your study involving elementary schools in Mississippi. We understand that you will ask the faculty members of North Bay Elementary to complete a survey and that teacher participation in this research is completely voluntary. The teachers' responses will be kept confidential and available only to the researcher for analysis purposes.

You may contact Dr. Frances Weiler, North Bay Elementary Principal, to make needed arrangements regarding your research. Her office number is (228) 467-4757 or you may e-mail Dr. Weiler at fweiler@bwsd.org.

Sincerely,

Kimberly M. Stasny

Kim Stasny, Ph.D., Superintendent of Education
Bay St. Louis-Waveland School District

cc: Dr. Frances Weiler, North Bay Elementary Principal

REFERENCES

Akin, J. (1987). *Music makes a difference.* Lafayette, California: Lafayette Arts and Science Foundation. Retrieved January 25, 2009, from http://www.nldline.com/music1.htm

Armstrong, T. (1994). *Multiple intelligences in the classroom.* Alexandria, VA: Association for Supervision and Curriculum Development.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York: Freeman.

Bartel, L. R. & Cameron, L. (2002). *Self-efficacy in teachers teaching music.* Proceedings of the American Educational Research Association Annual Conference, New Orleans. Retrieved on July 2, 2008, from http://www.oise.utoronto.ca/iige/biographies/bartel.htm

Begley, S. (1996) Your child's brain. *Newsweek.* Retrieved January 17, 2009, from http://www.newsweek.com/id/101523

Binet, A. (1905). *New methods for the diagnosis of the intellectual levels of subnormals.* First published in *L'Année Psychologique*, *12*, 191-244. Translation by Elizabeth Kite, 1916. Retrieved July 12, 2006, from http://psychclassics.yorku.ca/Binet/binet1.htm

Bloom, B. (1956). *Bloom's taxonomy.* Retrieved January 17, 2009, from http://www.learnnc.org/lp/pages/4719

Boyer, E. L. (1983). *High School: A report on secondary education in America.* (Sponsored by the Carnegie Foundation for The Advancement of Teaching.) New

York: Harper & Row.

Broad, M. L., & Newstrom, J. W. (1992). *Transfer of training.* Boston, MA: Addison-Wesley Publishing Company, Inc.

Brualdi, A. C. (1996). *Multiple intelligences: Gardner's theory.* Washington DC: ERIC Clearinghouse on Assessment and Evaluation. Retrieved August 19, 2007, from http://www.ericdigests.org/1998-1/multiple.htm

Catterall, J. S., Chapleau, R., & Iwanaga, J. (1999). *Involvement in the arts and human development: General involvement and intensive involvement in music and theatre arts.* Los Angeles: UCLA Imagination Project based on the National Education Logitudinal Survey of 1988. Retrieved January 05, 2009, from http://www.livemusictaskforce.org/media/arts-and-human-development.pdf

Campbell, B. (1990). The research results of a multiple intelligences classroom. *New Horizons for Learning Electronic Journal.* Retrieved April 1, 1999, from http://www.newhorizons.org/art_mireserch.html

Chan, D. W. (2003) Multiple intelligences and perceived self-efficacy among Chinese secondary school teachers in Hong Kong. *Educational Psychology, 23,* 5, 521-533.

Chen, M., Miller, B., Grube, J., & Waiters, E. (2006) *Music, substance abuse, and aggression.* Berkeley, CA: Pacific Research Center. Retrieved January 26, 2009, from http://www.udetc.org/documents/Rap_music_report.pdf

Chesky, K. S., Ho, K., & Hipple, J. (1998). *Musicians perceptions of wide spread drug use among musicians.* Poster presented at TMEA 1997 Clinic-Convention, San Antonio. Retrieved July 2005 from

http://www.hsc.unt.edu/research/ifd/music_medicine/research_pres_conf.html

College bound seniors national report: Profile of SAT program test takers. (2001) Princeton, NJ: The College Entrance Examination Board. Retrieved January 26, 2009, from http://www.theplayingcats.com/research/understanding_the_importance_of_music.pdf

Costa-Giomi, E. (1998). *The McGill piano project: effects of three years of piano instruction on children's cognitive abilities, achievement, and self-esteem.* Paper presented at the meeting of the Music Educators National Conference, Phoenix, Arizona. Retrieved on January 19, 2009, from http://www.theplayingcats.com/research/understanding_the_importance_of_music.pdf

DeLaat, J., & Watters, J. (1995). Science teaching self-efficacy in a primary school: A case study. *Research in Science Education, 25* (4), 453-464.

Douglas, S., & Willatts, P. (1994). The relationship between musical ability and literacy skills. *Journal of Research in Reading, 17*, 99-107.

ESEA Title I, Public law 89-10: Annual evaluation report for 1969-70. (1970). Retrieved January 24, 2009, from http://eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/35/1b/20.pdf

Friedman, B. (1960). *An evaluation of the achievement in reading and arithmetic of pupils in elementary school instrumental music classes.* New York University: Doctoral Dissertation. Dissertation Abstracts International, *60*, 3662A-3663A.

Gardiner, M. (2000). Music, learning, and behavior: A case for mental stretching. *Journal for Learning through Music,* 72-93. Retrieved June 20, 2008, from http://www.music-in-education.org/articles/1-R.pdf

Gardner, H. (1983, 1993). *Frames of mind: The theory of multiple intelligences.* New York: Basic Books.

Gardner, H. (1991). *The unschooled mind: How children think and how schools should teach.* New York: Basic Books.

Gardner, H. (1997). *Extraordinary minds: Portraits of exceptional individuals and an examination of our extraordinariness.* New York: Basic Books.

Gardner, H. (2002). *Disciplinary studies in an interdisciplinary world.* Keynote address at the 14th biennial NCISA Conference. Retrieved January 17, 2009, from http://www.isca.edu.au/html/PDF/conf%202002/Gardiner%20paper.pdf

Gardner, H. (2003). *Multiple intelligences after twenty years.* Paper presented at the American Educational Research Association, Chicago, Illinois, April 21, 2003. Retrieved August 19, 2007, from http://pzweb.harvard.edu/PIs/HGMIafter20years.pdf

Gardner, H., Csikszentmihalyi, M., & Damon, W. (2001). *Good Work: Where Excellence and Ethics Meet.* New York: Basic Books.

Gardner, H., & Hatch, T. (1989). Multiple intelligences go to school: Educational implications of the theory of multiple intelligences. *Educational Researcher, 18* (8),4-9.

Garet, M.S., et al. (2001). What makes professional development effective: Results from a national sample of teachers. *American Educational Research Journal,*

38 (4), 915-945.

Gibson, C., Folley, B. S., & Park, S. (2008). Enhanced divergent thinking and creativity in musicians: A behavioral and near-infrared spectroscopy study. *Brain and Cognition, 69 (1),* 162-169.

Gordon, E. E. (2003). *A music learning theory for newborn and young children.* Chicago: GIA Publications.

Guskey, T. R. (2000). *Evaluating professional development.* Thousand Oaks, CA: Corwin Press.

Guskey, T. R. (2001). Context variables that affect measures of teacher efficacy. *Journal of Educational Research, 81* (1), 41-47.

Guskey, T.R., & Sparks, D. (1996). Exploring the relationship between staff development and improvements in student learning, *Journal of Staff Development, 17* (4), pp.34-8.

Hanushek, E., Kain, J., & Rivki. S. (1998). *Teachers, schools and achievement.* Retrieved February 3, 2009, from http://www.mccsc.edu/~curriculum/teachers,%20schools,%20and%20acheivement.pdf

Harvard Project Zero. (2005). MI basics: The theory behind the practice. *AMI: Adult Multiple Intelligences.* Retrieved June 3, 2005, from http://pzweb.harvard.edu/AMI/mi.htm

Hatch, T., & Gardner, H. (1986). From testing intelligence to assessing competencies: A pluralistic view of intellect. *Roeper Review, 8* (3), 147-150.

Healy, J. (1999). *Endangered minds: Why children don't think and what we can do*

about it. New York: Simon & Schuster.

Hillery, M. (1979). *A guide to the use of street/folk musical games in the classroom.* Washington, DC: Office of Education. ERIC Document Reproduction Service.

Ho, Y., Cheung, M., & Chan, A. S. (2003). Music training improves verbal but not visual memory: Cross-sectional and longitudinal explorations in children. *Neuropsychology, 17* (3), 439-450.

Hodges, D. (2006). *What research tells us about child development and learning.* International Forum on Music Education. Retrieved January 19, 2009, from http://sites.google.com/site/donaldahodges/Home/publications-1

Hodges, D. (2007). Wired for music: The science of human musicality. *Dimensions.* Association of Science Technology Centers. Washington, D.C. Retrieved January 19, 2009, from http://10907252292105628-a-1802744773732722657-s-ites.googlegroups.com/site/donaldahodges/Home/publications-1/WiredforMusicASTC.pdf

Hodges, D., & O'Connell, D. (2005). *Impact of music education on academic achievement.* Retrieved January 17, 2009 from http://www.uncg.edu/mus/SoundsOfLearning/AcdemicAchievement.pdf

Husain, G. (2002) Effects of musical tempo and mode on arousal, mood, and spatial abilities. *Music perception, 20* (2), 151-171.

International Association for the Evaluation of Educational Achievement (IAEEA) Test. (1988). In American Music Conference: Music Research. Retrieved January 21, 2009, from: http://production.amc-music.org/childliterature.htm

Janata, P., & Grafton, S.T. (2003). Swinging in the brain: Shared neural substrates for

behaviors related to sequencing and music. *Nature neuroscience, 6* (7), 682-687. Retrieved January 17, 2009, from http://dbic.dartmouth.edu/grafton/papers/Janata.pdf

Johnston, E. (1997). *The history of intelligence testing.* Part of a lecture series on Investigating Minds. Retrieved on September 2, 2008 from http://pages.slc.edu/~97/Lecture17/L17.html

Jensen, E. (1998). *Teaching with the brain in mind.* Alexandria, VA: Association for Supervision and Curriculum Development.

Jensen, E. (2000). *Music with the brain in mind.* Alexandria, VA: Association for Supervision and Curriculum Development.

Kane, J. (2005). *New ways of "training" in primary school music education: Results and implications of a longitudinal research study.* Paper presented at the Australian Association for Research in Education Conference. Retrieved July 2, 2008, from http://www.aare.edu.au/05pap/kan05133.pdf

Kagan, S. (2001). Kagan structures are brain-based. Kagan Online Magazine. Retrieved March 17, 2009, from http://www.kaganonline.com/Kaganclub/Freearticle.html

Kelley, L. (1981). A combined experimental and descriptive study of the effect of music on reading and language. Doctoral Dissertation, University of Pennsylvania. Retrieved January 20, 2009, from http://repository.upenn.edu/dissertations/AAI8117801/

Killion, J. (1998). *What works in the middle: Results-based staff development.* Retrieved on February 2, 2009, from http://www.nsdc.org/midbook/

Klinedinst, R. (1991). Predicting performance achievement and retention of fifth grade

instrumental students. *Journal of Research in Music Education, 39* (3), 225-238.

Kornhaber, M. (1996). *The parking lot press*. A publication for the MI Strand of Project Zero's Summer Institute, July 1996. 1 (1), 1.

Lamb, S. & Gregory, A. (1993). The relationship between music and reading in beginning readers. *Educational Psychology, 13* (1), 19-27.

Langstaff, J., & Mayer, E. (1996). Music: exercise for the brain. *Learning*. March/April, pp. 62-64.

Lillemyr, O. F. (1983). *Achievement motivation as a factor in self-perceptions.* Paper presented at the annual meeting of the American Educational Research Association. Norwegian Reseearch Council for Science and the Humanities. ERIC Clearinghouse. Retrieved January 11, 2009, from http://eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/2e/85/97.pdf

National Association for Music Education. (2004). *Understanding the importance of a musical education*. Retrieved June 20, 2007, from http://www.theplayingcats.com/research/understanding_the_importance_of_music.pdf

National Association for Music Education. (2006). *Why music education?* Retrieved June 14, 2007, from http://www.menc.org/resources/view/why-music-education-2007

Machek, G. (2003). *Individually administered intelligence tests*. Retrieved September 2, 2008, from http://www.indiana.edu/-intell/intelligenceTests.shtml

Marzano, R, Pickering, D., & Pollack, J. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement.* Alexandria,

Virginia: The Association for Supervision and Curriculum Development.

McKelvie, P., & Low, J. (2002). Listening to Mozart does not improve children's spatial ability: Final curtains for the Mozart effect. *British Journal of Developmental Psychology, 20* (2), 241-258.

Mickela, T. (n.d.) Improve your brain. *Music Education Online*. Retrieved on January 19, 2009, from http://www.childrensmusicworkshop.com/advocacy/studentdevelopment.html

Moran, C. (2004, November 19). Low note sounds for music education. *The San Diego Union-Tribune,* p. B2.

Morgan, P. (2008) Teacher perceptions of physical education in the primary school: Attitudes, values, and curriculum preferences. *Physical educator*, Winter. Retrieved on July 29, 2009, from http://findarticles.com/p/articles/mi_hb4322/is_1_65/ai_n29428797/

Nantais, K. M., & Schellenberg, E. G. (1999). The Mozart effect: An artifact of preference. *Psychology Science, 10,* 370-373.

Osciak, S. Y. & Milheim, W. D. (2001). Multiple intelligences and the design of web-based instruction. *International Journal of Instructional Media*, 28 (4), 355-361.

Potter, R. (1997). Musical intelligence: The final frontier? *Phi Kappa Phi Journal. 77* (3) 1-4.

Ratey, J. (2001). *A User's guide to the brain.* New York: Pantheon Books.

Rauscher, F. H. (1999, Fall). Music exposure and the development of spatial intelligence in children. *Bulletin of the Council for Research in Music Education, 142,* 35-47. Retrieved January 15, 2009, from

http://www.uwosh.edu/departments/psychology/rauscher/BCRME99.pdf

Rauscher, F. H. (2000). *Is the Mozart effect debunked?* Poster presented at the bi-annual meeting of the International Conference on Music Perception and Cognition, Keele University, Keele, United Kingdom. Retrieved January 19, 2009 from http://www.uwosh.edu/departments/psychology/rauscher/Debunk.pdf

Rauscher, F. H. (2003) *Can music development affect children's cognitive development?* ERIC Clearinghouse on Early Education and Parenting. Retrieved January 26, 2009, from http://www.ericdigests.org/2004-3/cognitive.html

Rauscher, F., Shaw, G., & Ky, K. (1993). Music and spatial task performance. *Nature, 365,* 611.

Rauscher, F. H., Shaw, G. L., Levine, L. J., Wright, E. L., Dennis, W. R., & Newcomb, R. (1997). Music training causes long-term enhancement of preschool children's spatial-temporal reasoning abilities. *Neurological Research, 19,* 1-8. Retrieved January 21, 2009, from http://www.uwosh.edu/psychology/rauscher.htm

Resnick, L. (Ed.). (1989). *Knowledge, learning, and instruction: Essays in honor of Robert Glaser,* 453-494. Hillsdale, NJ: Erlbaum.

Riggs, I. M. (1995). *The characteristics of high and low efficacy elementary teachers.* Paper presented at the annual meeting of the National Association of Research in Science Teaching, San Francisco, CA. Retrieved May 5, 2008, from http://www.linkinghub.elsevier.com/retrieve/pii/so742051x00000548

Riggs, I. M., & Enoch, L. G. (1990). Toward development of an elementary teacher's science teaching efficacy instrument. *Science Education, 74,* 625-637.

Ross, E. W., Cornett, J. W., & McCutcheon, G. (Eds.). (1992). *Teacher personal*

theorizing: Connecting curriculum practice, theory and research. Albany, NY: State University of New York Press.

Rumsey, M. G., Walker, C. B., & Harris, J. H.(Eds.). (1994) *Personal selection and classification,* pps. 261-271. Hillsdale, NJ: Erlbaum.

Sarkamo, T. (2008). *Listening to music improves stroke patients' recovery.* Retrieved January 2, 2009, from http://www.eurekalert.org/pub_releases/2008-02/uoh-ltm021508.php

Schellenberg, G. (2004) Music lessons enhance IQ. *Psychological Science, 15* (8), 511-514. Retrieved January 25, 2009, from http://www.erin.utoronto.ca/~w3psygs/SchellenbergPS2004.pdf

Schlaug, G. (2001). *The brain of musicians: A model for structural and functional adaptation.* Retrieved January 25, 2009, from http://www.musicianbrain.com/papers/Schlaug_NYAS_2001.pdf

Schlaug, G., Jancke, L., Huang, Y., & Steinmetz, H. (1995) In vivo evidence of structural brain asymmetry in musicians. Science, 267 (5198), 699-701. Retrieved March 13, 2009, from http://www.sciencemag.org/cgi/content/abstract/267/5198/699

Schmidt, Joan (2007). *Music makes a difference.* American Music Conference. Retrieved March 12, 2009 from http://www.amcmusic.org/musicmaking/schools/difference.htm

Sergeant, J., Zuck, E., Tenial, S., & MacDonall, B. (1992). Distributed neural network underlying musical sight reading and keyboard performance. *Science*, 257, 106-109.

Sinatra, R. (1986). *Visual literacy connections to thinking, reading and writing.* New

York: Charles C. Thomas.

Society for Neuroscience (2007, January 13). Musician in the mirror: new study shows brain rapidly forms link between sounds and actions that produce them. *ScienceDaily*. Retrieved June 25, 2009, from http://www.sciencedaily.com/releases/2007/01/070112155201.htm

Sousa, D. A. (1995). *How the Brain Learns*. Reston, VA: National Association of Secondary School Principals.

Texas Music Project. (2007). *Why music education?* Retrieved March 22, 2008 from http://www.texasmusicproject.org/WhyMusicEd.html

Tomlinson, C. (1995). *Differentiating instruction for advanced learners in the mixed-ability middle school classroom.* ERIC Clearinghouse on Assessment and Evaluation. Retrieved September 6, 2004 from http://www.ericec.org/digests/e536.html

Webb, N. (2005). *Depth of knowledge training*. Jackson, MS: Mississippi Department of Education.

Weinberger, N. (1997). The musical hormone. *Music and Science Information Computer Archive, 4* (2). Retrieved January 17, 2009 from http://larkinthemorning.com/article.asp?AI=49&bhcd2=1232229439

Weinberger, N. (1998). Brain, behavior, biology, and music: Some research findings and their implications for educational policy. *Arts Education Policy Review, 99* (3), 28–36.

Weinberger, N. (1999). Can music really improve the mind? The question of transfer effects. *Psychology of Music*, 6 (2), 5-7. Retrieved January 19, 2009, from

http://www.musica.uci.edu/mrn/V6I2S99.html#improve

Weinberger, N. (2000). Music and the brain: A broad perspective. *Music Educators Journal, 87*, 2. ProQuest Direct Complete. Retrieved on January 17, 2009 from http://128.200.122.84/weinberger/Weinberger,%202000.pdf

Weinberger, N. (2006). Music and the brain. *Scientific American: Secrets of the senses. 16* (3), 36–43.

New York: Vintage Books.

Whitwell, D. (1977). Music learning through performance. A paper commissioned by *Texas Music Educators Association.*

Willis, S., & Mann, L. (2000, Winter). Differentiating instruction: Finding manageable ways to meet individual needs. *Curriculum.* Retrieved September 6, 2004, from http://www.ascd.org/ed_topics/cu2000win_willis.html

Wilson, F. (1999) *The hand: How its use shapes the brain, language, and human culture.*

New York: Vintage Books.